

WATSON MEDICAL



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THE 200 DIAGNOSTIC TESTS YOU
NEED TO KNOW FOR THE EXAM

Most commonly seen questions
Diagnostic test?

Understand what test to order and when

Avoid the common pitfalls of Steps 2 & 3

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USMLE™ and Internal Medicine Board Courses

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CARDIOLOGY

Ergonovine Test

- 1. What is this?**
- 2. When is ergonovine testing the answer?**
- 3. What is the treatment?**

A.

CARDIOLOGY

1. Ergonovine testing involves the injection of ergonovine to provoke coronary vasospasm. This is the diagnostic maneuver to detect **Prinzmetal's angina, which is coronary vasospasm.**
2. Answer ergonovine testing is the **most accurate** test when they give you a younger patient (<45) complaining of atypical anginal-type chest pain who has clean coronaries on cardiac catheterization. The pain will not bear a fixed relationship to exercise.
3. Prinzmetal's variant angina is treated with calcium channel blockers and nitrates.





CARDIOLOGY

Stress Echocardiogram

- 1. What is this?**
- 2. How is it done?**
- 3. What constitutes a positive test?**
- 4. When do you answer it?**

CARDIOLOGY

1. Stress echocardiogram is used to confirm the suspicion of coronary artery disease and estimate its severity.
2. It uses both 2D echocardiogram and Doppler echocardiogram to detect ischemia. Myocardial injury gives a decrease in systolic contraction of the ischemic area, called a “regional wall motion abnormality.” The patient is asked to exercise using a treadmill or bicycle. If she cannot exercise, **Dobutamine** can be used to increase myocardial demand.
3. A positive test consists of new regional wall motion abnormalities, a decline in ejection fraction, and an increase in end-systolic volume with stress on stress echo.
4. Answer stress echo when the case is equivocal for ischemic heart disease and the EKG is so abnormal that you cannot read it for ischemia.



CARDIOLOGY

Stress (Exercise Tolerance) Testing

- 1. What is it?**
- 2. How is it done?**
- 3. When is stress testing the answer?**
- 4. What is the most accurate test?**

CARDIOLOGY

1. Stress testing is the attempt to detect myocardial ischemia in patients without the need for coronary angiography. It is used when the diagnosis of ischemia is not clear in a person who has chest pain.
2. The patient exercises to $>80\%$ of maximum heart rate based on a maximum rate of $220 - \text{age}$. The EKG is observed for signs of ischemia, such as ST segment depression. Hypotension, lightheadedness, and chest pain are taken as positive tests as well.
3. Answer stress test:
 - when the pain is atypical and the story is equivocal;
 - post myocardial infarction to determine the need for angiography;
 - with patients on medications to determine if the amounts of medications are sufficient to prevent ischemia.
4. Abnormal stress tests are confirmed with coronary angiography.



CARDIOLOGY

Persantine Thallium

- 1. What is this?**
- 2. How is it done?**
- 3. When do you answer it?**
- 4. When is it the wrong answer?**
- 5. What is the alternative choice?**
- 6. What is the most accurate diagnostic test?**

A.

CARDIOLOGY

1. Persantine thallium is a form of exercise tolerance or “stress” testing. It is a non-invasive method of determining myocardial perfusion that uses a medication to substitute for physical exercise.
2. Persantine (also called dipyridamole) is a phosphodiesterase inhibitor that dilates coronary arteries and increases oxygen flow to the myocardium. Thallium is a radioisotope that should be picked up by normal myocytes. Persantine gives increased thallium uptake in the normal areas of the heart and less in the diseased parts of the heart.
3. Answer persantine thallium when patients cannot exercise sufficiently to do a standard exercise tolerance test. The patient has a history of chest pain but you are not certain if it is ischemic in nature. It can also be used for preoperative screening.
4. Persantine cannot be used for patients with asthma, COPD, or emphysema because it provokes bronchospasm. Stress testing in general should not be done with an acute infarction or unstable angina.
5. Use a dobutamine echocardiographic stress test when you cannot use persantine.
6. The single most accurate test of myocardial perfusion is the coronary artery angiogram.



CARDIOLOGY

Thallium Stress Testing

- 1. What is this?**
- 2. When is thallium stress testing the answer?**
- 3. What is the most accurate test?**

CARDIOLOGY

1. Thallium scanning is the most accurate method of assessing myocardial perfusion without an angiography.
2. Thallium-labeled red cells are injected into the patient's bloodstream. A thallium scan provides a view of the blood flow into the heart muscle. Stress thallium is an alternative to stress echo. The indications for stress thallium are:
 - when resting EKG changes make exercise EKG difficult to interpret, such as the presence of an LBBB, baseline S-T changes, left ventricular hypertrophy, pacemaker, or the effect of digoxin on the EKG;
 - to localize the region of ischemia;
 - to assess revascularization following bypass or angioplasty.
3. The most accurate test of myocardial perfusion is a coronary angiogram.



CARDIOLOGY

Dobutamine Stress

- 1. What is this?**
- 2. How is it done?**
- 3. When do you answer it?**
- 4. What is the most accurate diagnostic test?**

CARDIOLOGY

1. Dobutamine stress testing is a form of exercise tolerance or “stress” testing that does not use physical exercise. It is a noninvasive method of determining myocardial perfusion.
2. Dobutamine is a direct-acting agonist at beta-1-adrenergic receptors, causing inotropic stress. Dobutamine is injected and the echo is observed for a decrease in wall motion. Ischemic myocardium does not move as well as normal myocardium.
3. Dobutamine is used in patients who cannot exercise. Look for a person who has a history of chest pain but in whom the story is equivocal and the EKG is nondiagnostic. The indications are the same as those for persantine stress testing. It is also used for patients with reactive airways diseases who cannot undergo a persantine thallium test.
4. The coronary angiogram is the most accurate test of myocardial perfusion.



CARDIOLOGY

Sestamibi Testing

- 1. What is this?**
- 2. How is it done?**
- 3. When do you answer it?**

A.

CARDIOLOGY

1. A sestamibi test is a type of nuclear stress test, also named Tc99m.
2. Tc99m-labeled compounds require intact perfusion, and a viable myocardial cell. Essentially, a myocardial perfusion agent is indicated for detecting coronary artery disease. Diseased or infarcted myocardium picks up less of the nuclear isotope. Ischemic myocardium re-perfuses at rest. The defect is “reversible.” Infarcted myocardium does not change with rest.
3. The bottom-line answer for Sestamibi is that it is a nuclear stress test that you use with **obese patients and female patients with large breasts.**



CARDIOLOGY

MUGA Scans (Multiple Gated Acquisition Scan)

- 1. For which condition is this the most accurate test?**
- 2. How is it performed?**
- 3. When do you answer MUGA scan?**

CARDIOLOGY

- 1.** MUGA is the single most accurate method of assessing ejection fraction. MUGA also assesses left ventricular wall motion and cardiac muscle damage.
- 2.** MUGA is performed by injecting red blood cells, radiolabeled with technetium 99, into the patient's bloodstream and recording the emissions with a gamma camera.
- 3.** MUGA is very useful in assessing and following cardiac function in patients during the delivery of potentially cardiotoxic chemotherapy such as adriamycin. The accuracy and reproducibility of the study make it suitable to detect subtle, early changes in cardiac function that might easily be missed by other techniques, such as the echocardiogram.



CARDIOLOGY

Coronary Angiography or Cardiac Catheterization

- 1. What is it?**
- 2. When is it the answer?**
- 3. What does it show?**

CARDIOLOGY

1. An angiography is the placement of a catheter from the femoral or brachial artery into the coronary artery with the injection of iodinated contrast material.
2. Angiography is the answer when:
 - the cardiac stress test is abnormal,
 - prior to coronary surgery or angioplasty,
 - in an acute coronary syndrome such as unstable angina.
3. Angiography provides an exact measure of the degree of stenosis of the coronary artery and the number of vessels involved. The degree of stenosis must be $>70\%$ to be considered significant.



CARDIOLOGY

CK-MB

- 1. What is it?**
- 2. When is this the right answer?**

CARDIOLOGY

1. CK-MB is elevated in the serum as a marker for myocardial injury. CK-MB is useful in detecting infarction and therefore the right answer in assessing any patient with chest pain especially with cardiac risk factors. CK-MB normally increases within 4 to 6 hours from the start of the chest pain. It peaks at about 12–24 hours. CK-MB has a relatively short half-life when compared to the other specific myocardial marker troponin. CK-MB is particularly useful in detecting **re-infarction**.
2. Answer CK-MB when there is a patient with chest pain that is possibly ischemic in nature. The EKG does **not** have to have ST segment elevation in order for the CK-MB to be abnormal. Answer CK-MB when chest pain recurs after an infarction within the last few days.



CARDIOLOGY

BNP (Brain Natriuretic Peptide)

- 1. What is this?**
- 2. When is BNP the answer?**
- 3. What is the most accurate test?**

CARDIOLOGY

1. Brain natriuretic peptide (BNP) is a hormone released from the heart and brain in response to stretch of the atria and ventricles. BNP has diuretic, natriuretic, and hypotensive effects and inhibits the renin-angiotensin system in response to fluid overload states. BNP goes up with congestive heart failure and other causes of hypervolemia.
2. BNP is the answer when the patient is short of breath and the history and physical are not sufficiently specific to make an accurate diagnosis. BNP is sensitive but not specific for CHF. Is it CHF, pneumonia, COPD, or an embolus? Use BNP to help exclude CHF.
3. An elevated BNP is confirmed with an echocardiogram.



CARDIOLOGY

Troponin Levels

- 1. What are they?**
- 2. When are they the answer?**
- 3. What is the most accurate test?**

CARDIOLOGY

1. Troponin is an enzyme that is released only from injured myocardium. Troponin is extremely specific for the myocardium and is rarely derived from other sites in the body.
2. Troponin levels are the answer in most acute coronary syndromes as the most accurate means of assessing myocardial ischemia or infarction. Answer troponins in all patients in the emergency department with acute, severe pain. This is true even if the EKG is normal.
3. Myocardial ischemia as found by elevated levels of troponins is confirmed with EKG, echocardiography, and angiography.



CARDIOLOGY

Tilt-Table Testing

- 1. What is tilt-table testing?**
- 2. How is it performed?**
- 3. When is it the answer?**

CARDIOLOGY

- 1.** Tilt-table testing is used to evaluate unexplained syncope. It is the measurement of blood pressure and pulse at various angles while the patient is tilted up and down while lying on a table.
- 2.** Blood pressure and pulse are measured before and after moving the patient into different positions. The development of syncope, dizziness, or abnormal drops in blood pressure constitute an abnormal test. Isoproterenol and nitroglycerin can be used as provocative testing.
- 3.** Answer tilt-table when there is unexplained syncope, particularly when there are signs of orthostasis such as an inappropriate bradycardia when standing up.



CARDIOLOGY

Transesophageal Echocardiography (TEE)

- 1. What is this?**
- 2. How is it done?**
- 3. When do you answer it?**
- 4. What is the most accurate diagnostic test?**

CARDIOLOGY

1. Transesophageal echocardiography (TEE) is an extremely sensitive method of assessing cardiac structure. TEE is particularly sensitive at assessing posterior structures of the heart such as diseases of the aorta; for example, dissection or aneurysm, atrial thrombi, patent foramen ovale, or vegetations on valves for the diagnosis of endocarditis. TEE is used when limited transthoracic echocardiogram is inadequate.
2. TEE is performed by placing a sonographic transducer through the mouth into the esophagus.
3. TEE is used to assess valvular heart disease as well as **before the cardioversion of atrial fibrillation to exclude thrombi in the left atrium.**
4. The most accurate diagnostic test is a cardiac catheterization of the left heart.



CARDIOLOGY

Transthoracic or 2D Echocardiogram (TTE)

- 1. What is this?**
- 2. How is it done?**
- 3. When do you answer it?**
- 4. What is the most accurate diagnostic test?**

A.

CARDIOLOGY

1. Transthoracic echo (TTE) is used to detect chamber size and function, valve abnormalities, intracardiac masses, pericardial effusions, and aortic disease.
2. Images of the heart are obtained from a sonographic transducer placed over the anterior wall of the chest.
3. TTE is done to assess every patient with an auscultatory abnormality for the severity of valve dysfunction. TTE has become the second most frequently done test to evaluate the heart after EKG. TTE is done to assess every patient with congestive failure (CHF) to obtain the ejection fraction. Therapy for CHF differs markedly based on whether there is systolic or diastolic dysfunction.
4. Both the transesophageal echo and the coronary angiogram are more sensitive than the TTE.



CARDIOLOGY

Cardiac Electrophysiological (EP) Studies

- 1. What is an EP study?**
- 2. When is an EP study the answer?**

CARDIOLOGY

1. An EP study is the introduction of a catheter with an electrical sensing and stimulating electrode into the heart. This allows both the detection of abnormal cardiac rhythm disturbances as well as the stimulation of the heart to determine the site of origin of an abnormal rhythm.
2. EP studies are used for:
 - definitive diagnosis of abnormal cardiac rhythms, particularly the etiology of unexplained syncope;
 - mapping of the cardiac conduction system;
 - ablation of aberrant conduction tract abnormalities such as SVT or Wolff-Parkinson-White syndrome;
 - placement of automatic implanted cardioverter/defibrillators;
 - searching for the site of origin of sustained ventricular tachycardia.



CARDIOLOGY

Holter Monitoring or 24-Hour Continuous Ambulatory Cardiac Monitoring

- 1. What is this?**
- 2. How does it work?**
- 3. What is the most accurate test?**
- 4. When do you answer Holter monitor?**

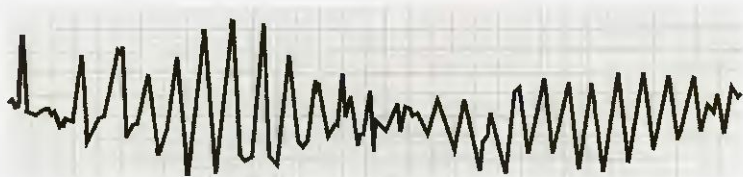
CARDIOLOGY

- 1.** Holter monitoring is a way of recording an EKG for 24 hours of continuous readings from a single lead.
- 2.** The patient wears leads on his chest and carries the recording device around his neck like a portable tape or CD player while he is at home. The strip can then be analyzed at high speed by the physician to detect brief rhythm disturbances that may not have been detected on the original EKG.
- 3.** Abnormalities on the Holter can be further analyzed by electrophysiological studies in a laboratory and by echocardiogram.
- 4.** Answer Holter monitor when the patient has palpitations or syncope and the EKG does not detect an abnormality.



CARDIOLOGY

1. What is this?
2. What is the characteristic on the EKG that gives the diagnosis?
3. What is the case that will go along with this EKG?



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A.

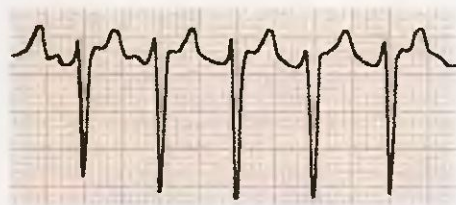
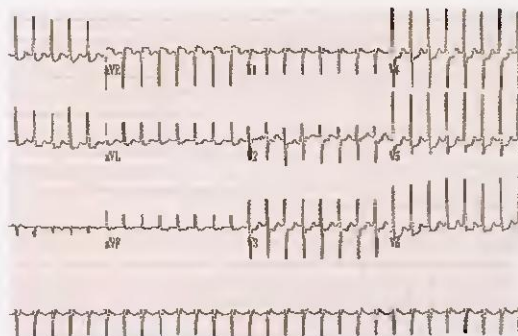
CARDIOLOGY

1. The EKG shows Torsade de pointes.
2. The most distinctive feature of Torsade on EKG is the “undulating” amplitude that gives the impression of the EKG “twisting” around a point. Torsade is a form of wide-complex tachycardia. The QRS width or duration is >120 msec. Essentially, Torsade is ventricular tachycardia with an undulating amplitude.
3. Just like ventricular tachycardia, Torsade may present with anything from simple palpitations to syncope to sudden death. You cannot tell without the EKG. Look for hypomagnesemia in the question. Torsade can also be caused by the toxicity of medications such as tricyclic antidepressants, amiodarone, dofetilide, ibutilide, macrolides, and, rarely, quinolone antibiotics.



CARDIOLOGY

1. What is the diagnosis?
2. What case will go along with this EKG?
3. How do you treat it?



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CARDIOLOGY

1. This EKG shows **supraventricular tachycardia (SVT)**. SVT is a regular tachycardia with narrow QRS complexes, and no apparent P-waves, fibrillatory waves, or flutter waves. A normal QRS duration is <120 milliseconds.
2. Look for a patient who presents with rapid palpitations and lightheadedness. Triggers include the intake of caffeine or other sympathetic system-stimulating drugs, psychological distress, and hyperthyroidism.
3. Treatment includes **carotid massage**, followed by **intravenous adenosine**. If adenosine does not work, calcium channel blockers (e.g., verapamil or diltiazem), digoxin, or beta blockers can be used.

CARDIOLOGY

1. What is the diagnosis?
2. What case will go along with this EKG?
3. How do you treat it?



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A.

CARDIOLOGY

1. This EKG shows a wide-complex tachycardia that is indicative of **ventricular tachycardia**.
2. Look for a patient presenting with syncope, lightheadedness, symptoms of congestive heart failure, or sudden death. The range is very broad and there may only be palpitations.
3. Treatment for ventricular tachycardia depends on patient stability:
 - Unstable patients: electrical cardioversion
 - Stable patients: amiodarone, lidocaine, procainamide



CARDIOLOGY

1. What is this?
2. What is the characteristic on the EKG that gives the diagnosis?
3. What is the case that will go along with this EKG?



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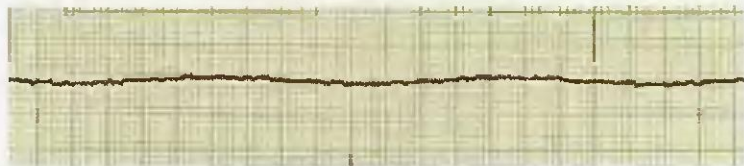
CARDIOLOGY

1. The EKG shows ventricular fibrillation (Vfib).
2. The EKG has no organized activity at all. There may be either low or high amplitude to the EKG tracing. If you see either an organized P-wave, QRS, or regular rhythm, then it is **not** Vfib. On the other hand, there is electrical activity. It is not flat like it is in asystole.
3. Patients with Vfib have no pulse and no respirations. They have no blood pressure and have suffered "cardiac arrest." You cannot distinguish between Vfib, asystole, pulseless electrical activity, and certain forms of pulseless ventricular tachycardia without an EKG.



CARDIOLOGY

1. What is this?
2. What is the characteristic on the EKG that gives the diagnosis?
3. What is the case that will go along with this EKG?



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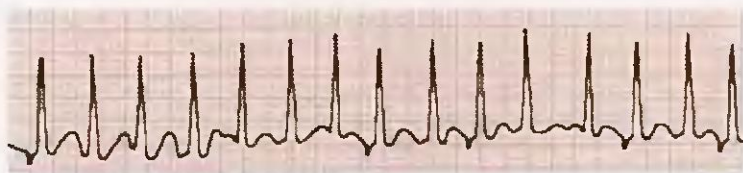
CARDIOLOGY

1. The EKG shows asystole.
2. There is no significant activity of any kind. Asystole will not, however, give you a perfectly flat line. There will still be a modest bit of undulation of the baseline. When the term “flatline” is used, however, they are still referring to asystole.
3. Answer asystole for a patient who suddenly loses his pulse and blood pressure, but other causes of pulselessness have been excluded. It is not possible to distinguish between asystole, ventricular fibrillation, pulseless electrical activity from tamponade, or tension pneumothorax without an EKG.

Q.

CARDIOLOGY

- 1. What is the diagnosis in this EKG?**
- 2. What is distinct about this rhythm on the EKG?**
- 3. What is the most common cause of this EKG finding?**



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A.

CARDIOLOGY

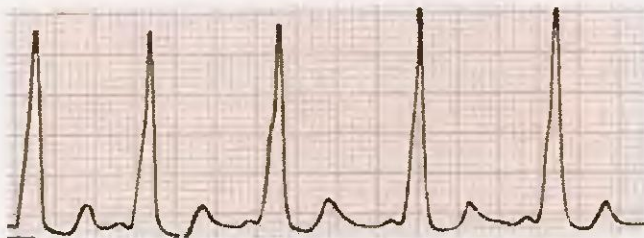
1. The EKG shows multifocal atrial tachycardia (MAT).
2. MAT is characterized by irregularly irregular rhythm as demonstrated by variability in the P-P intervals and the R-R intervals. There are multiple P-R intervals and at least three different P-wave morphologies. The atrial rate is over 100 per minute. When the rate is lower it is no longer a "tachycardia" and is called "wandering atrial pacemaker."
3. MAT is caused by right heart strain and the effect of chronic pulmonary disease on the right side of the heart such as in COPD.





CARDIOLOGY

- 1. What disease would cause this EKG?**
- 2. What characteristics of the EKG tell you the diagnosis?**
- 3. What case in the question will go along with this EKG?**
- 4. What is the pathology behind the EKG changes and this disease?**



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CARDIOLOGY

1. This EKG shows the delta wave of Wolff-Parkinson-White (WPW), which is a ventricular pre-excitation syndrome.
2. The EKG shows a short PR interval and slurring on the upstroke of the QRS (delta wave).
3. The patient can have supraventricular tachycardia (SVT) alternating with ventricular tachycardia. There will be both pre-excitation on the EKG and paroxysmal tachycardia. The SVT may be described as “worsened after a calcium blocker or digoxin.”
4. An accessory pathway for cardiac conduction from the atria to the ventricles that bypasses the AV node and causes earlier activation (pre-excitation) of the ventricles.



ONCOLOGY

Colposcopy

- 1. What is this?**
- 2. What must be visualized for a sufficient study?**
- 3. When is colposcopy the answer?**

ONCOLOGY

1. A colposcopy is the direct visualization of the cervix by placing a magnifying scope with a lamp into the vagina.
2. The **transition zone** must be visualized to ensure an adequate colposcopy. This is the border between squamous and columnar epithelium.
3. Answer colposcopy when the case describes a patient with an abnormal Pap smear. The following findings on Pap smear necessitate colposcopy:
 - Atypical squamous cells—cannot exclude high grade lesion (ASC-H)
 - Low-grade squamous intraepithelial lesion (LSIL)
 - High-grade squamous intraepithelial lesion (HSIL)
 - Atypical squamous cells of undetermined significance (ASCUS) if HPV DNA testing is positive



ONCOLOGY

Alpha Fetoprotein (AFP)

- 1. What diseases is it associated with?**
- 2. When do you answer AFP?**

ONCOLOGY

- 1.** Alpha fetoprotein (AFP) is associated with the development of:
 - hepatocellular carcinoma
 - ovarian cancer
 - non-seminomatous germ cell tumors

- 2.** Answer AFP when you see a patient with alcoholic cirrhosis or chronic hepatitis B or C. AFP together with radiologic imaging is used to screen for hepatocellular carcinoma.



ONCOLOGY

Carcinoembryonic Antigen (CEA)

- 1. What is it?**
- 2. For which disease does it have prognostic value?**
- 3. When do you answer CEA?**
- 4. When do you answer CEA as a screening test?**

ONCOLOGY

1. CEA is a protein that is elevated in the serum in a variety of cancers, including colorectal cancer (CRC).
2. Serum levels of CEA have prognostic value in patients with newly diagnosed CRC. Those with higher levels have a worse prognosis than those with lower levels.
3. Answer CEA level to monitor colon cancer patients after surgical resection. This determines the presence of persistent, recurrent, or metastatic disease.
4. CEA levels are **never** the right answer as a screening test for colon cancer.



ONCOLOGY

Estrogen and Progesterone Receptors

- 1. What are these tests?**
- 2. What is the therapy?**

ONCOLOGY

1. Estrogen and progesterone receptors should be done on all patients with breast cancer in order to determine who should receive hormone receptor therapy.
2. Therapy with either tamoxifen or raloxifene should be added for any patient with positive receptors. This is either for estrogen or progesterone positivity alone or in combination. The response to tamoxifen is better if both receptors are positive.



ONCOLOGY

Mammogram

- 1. When do you answer mammogram?**
- 2. When there is an abnormality what is the next best step?**
- 3. When does screening lower mortality the most?**

ONCOLOGY

1. Screening mammogram should begin at age 40 and should be performed every 1–2 years. Screening after age 50 is yearly.
2. When the mammogram shows abnormalities, a core biopsy including sentinel node biopsy is the next best test. Carcinomas of the breast are associated with clustered polymorphic microcalcifications. Mammography is also used when a breast mass is found on exam to locate additional lesions in the same breast or bilateral disease.
3. Screening lowers mortality most after age 50, and the decrease is greater than that with colonoscopy or Pap smear.



ONCOLOGY

Papanicolaou (Pap) Smear

- 1. What is it?**
- 2. When is Pap smear the answer?**
- 3. If results are positive, what is the next best test?**

ONCOLOGY

- 1.** The Pap smear is a test that examines the cells of the cervix. It is a screening method to find cancerous or precancerous cervical lesions. Pap smear does decrease mortality in screened populations.
- 2.** Pap smear should be started at age 21 or within 3 years of the onset of sexual activity, whichever is earlier. The test should be done every 2–3 years and can be stopped at age 65.
- 3.** Abnormalities on Pap smear are evaluated with colposcopy in order to biopsy the cervix.



ONCOLOGY

PET Scanning

- 1. What is this?**
- 2. What makes it abnormal?**
- 3. When is it the answer?**

1. PET means “positron emission tomography.” This measures the metabolic activity of a lesion seen on a CT or MRI scan. It is based on the ability of most cancers and some infections to have the increased uptake of 18-fluorodeoxyglucose. It is a noninvasive test of the actual function of a mass lesion, not just its size and location.
2. Most cancers and some infections have an increased uptake of the tagged glucose.
3. A PET scan can tell if a lesion, such as a lung mass, that might otherwise look malignant, really is malignant. For instance, if you are shown a case of a localized lung cancer diagnosed with biopsy, you can use the PET scan to see if there are metastases. If there is a mass in the contralateral chest that is malignant, it makes the patient ineligible for surgery with curative intent. If the PET scan shows a low uptake of the tagged glucose, then the lesion is likely benign and you should proceed with the surgery to remove the primary tumor site.



ONCOLOGY

PSA (Prostate-Specific Antigen)

- 1. What is this?**
- 2. When should it be done?**
- 3. What is the most accurate test?**
- 4. What test is done next if the PSA is positive?**

ONCOLOGY

1. PSA increases can occur in prostatitis, BPH, prostate cancer, and prostate biopsies. Levels are undetectable after total resection of the prostate.
2. PSA testing is extremely controversial. There is **no** evidence that PSA testing lowers mortality when used as a routine screening test. If the question says the patient is requesting the test, then you should do it.
3. Biopsy of the prostate is the most accurate diagnostic test.
4. If the PSA is elevated, a digital rectal exam is performed to palpate a lesion. If a lesion is found, it should be biopsied. If no lesion is found, a trans-rectal ultrasound should be performed to find a lesion to biopsy. If no lesion can be found, then "blind biopsies" should occur.



ONCOLOGY

Sentinel Node Evaluation

- 1. What is this?**
- 2. How is this done?**
- 3. When is this the answer?**

ONCOLOGY

1. The sentinel node biopsy is used in the evaluation of breast cancer.
2. A sentinel node biopsy is when dye is introduced into the operative field. The first node it goes to is the “sentinel” node. If it has cancer, you dissect the axilla. If it is negative, you do **not** need to do an axillary lymph node dissection.
3. Look for a patient with an abnormal mammogram in whom the biopsy shows cancer. Then answer sentinel node biopsy. Sentinel node biopsy is the best test to do after the initial diagnosis of breast cancer has been made with either a needle or excisional biopsy. Sentinel node biopsy can eliminate the need for axillary lymph node dissection.



HEMATOLOGY

Factor V Leiden Mutation

- 1. What is this?**
- 2. When do you answer Factor V Leiden mutation?**
- 3. What other tests should be sent with it?**

HEMATOLOGY

1. Factor V Leiden mutation predisposes to thrombosis by resistance to the antithrombotic effects of activated protein C. Protein C normally slows the clotting cascade by inhibiting Factor V. The mutation allows Factor V to ignore the natural anticoagulant action of protein C. Factor V Leiden is the most common cause of inherited thrombophilia.
2. Answer Factor V Leiden mutation as the most accurate test for a young person with an unprovoked DVT or PE. Thrombotic events after plane flights should evoke an investigation for thrombophilia.
3. The other tests of hypercoagulable states are:
 - Protein S
 - Protein C (when you see skin necrosis in the case)
 - Lupus anticoagulant (when you see an elevated PTT or spontaneous abortions in the case)
 - Antithrombin III mutation (when you see resistance to heparin in the case)



HEMATOLOGY

Haptoglobin Levels

1. What is it?
2. When do you answer haptoglobin level?



HEMATOLOGY

Hemoglobin Electrophoresis

- 1.** For which clinical condition(s) is this test used?
- 2.** What signs/symptoms would prompt you to order such a test?



HEMATOLOGY

Hemoglobin Electrophoresis

1. For which clinical condition(s) is this test used?
2. What signs/symptoms would prompt you to order such a test?

A.

HEMATOLOGY

1. Haptoglobin is used to determine hemolysis. It is a protein that binds to free hemoglobin. So when we have hemolysis, RBCs will release free hemoglobin that will bind to haptoglobin. This will result in decreased haptoglobin levels. In hemolysis we also find an elevated level of LDH, reticulocytes, and indirect bilirubin.
2. The typical scenario will be the sudden onset of anemia without gastrointestinal bleeding. The presence of jaundice is also highly suggestive. Acute anemia minus GI bleeding equals hemolysis.



HEMATOLOGY

Hemoglobin Electrophoresis

1. For which clinical condition(s) is this test used?
2. What signs/symptoms would prompt you to order such a test?

HEMATOLOGY

1. Hemoglobin electrophoresis is the most sensitive test to diagnose hemoglobinopathies such as sickle cell disease (SCD) or thalassemia. It is the most accurate way to diagnose the presence of the heterozygous forms of these diseases or the “trait.”
2. With respect to **SCD**, clinical presentations include ulcerations of the skin of the legs, recurrent infections with *Pneumococcus* or *Haemophilus*, retinopathy, aseptic necrosis of the femoral head, osteomyelitis, growth retardation, and splenomegaly. Typically, the patient will be African-American with a possible family history of the disease. Sickle cell trait will be in a patient who is asymptomatic with a family member with sickle cell disease or who has unexplained hematuria.

With respect to the thalassemia, clinical presentations range from normal to severely symptomatic with growth failure, hepatosplenomegaly, jaundice, and bony deformities.



HEMATOLOGY

Leukocyte Alkaline Phosphatase (LAP) Score

- 1. What is LAP?**
- 2. When is LAP the answer?**

A.

HEMATOLOGY

1. Leukocyte alkaline phosphatase (LAP) is an enzyme in white blood cells. If the cells are elevated in number and the function is normal, the LAP score will go up in proportion to the elevated cell count.
2. LAP is a test for chronic myelogenous leukemia (CML). Answer LAP when the white cell count is extremely high and the differential shows mostly neutrophils. The case is likely also to have a big spleen, giving left upper quadrant pain and early satiety. LAP scores should be low in CML, and are used to differentiate CML from a leukemoid reaction.



HEMATOLOGY

Lymph Node Biopsy

- 1. When is a needle biopsy the answer?**
- 2. When is an excisional biopsy the answer?**

A.

HEMATOLOGY

1. Needle biopsy of a lymph node is used to detect infections such as tuberculosis, fungi, and staphylococcus. Infections are suggested by nodes that are warm, tender, and sometimes red.
2. Excisional lymph node biopsy is the single most accurate test to diagnose lymphoma. A needle biopsy of a lymph node is the most common wrong answer in the diagnosis of lymphoma. There is insufficient tissue in a needle biopsy of a node to diagnosis lymphoma. In addition, the individual lymphocytes will appear normal on a needle biopsy. The diagnosis of lymphoma requires the visualization of the architecture of the entire node. Nodes with lymphoma are nontender, not red, and not warm as they would be with an infection.



HEMATOLOGY

Mixing Studies

- 1. What is it?**
- 2. When is this the best test?**
- 3. If the test normalizes after the mixing, what does this mean?**
- 4. What is the next best test if the study normalizes?**
- 5. If the test does not normalize after the mixing, what does this mean?**

A.

HEMATOLOGY

1. Methylmalonic acid (MMA) builds up when vitamin B12 is deficient. MMA has greater sensitivity than vitamin B12 levels. Homocysteine is elevated in both B12 and folic acid deficiency.
2. Answer MMA when the patient has macrocytic anemia and hypersegmented neutrophils but a normal B12 level. When there is a story like B12 deficiency and the B12 level is normal, answer: MMA level.



HEMATOLOGY

Methylmalonic Acid Level

- 1. What is this?**
- 2. When do you answer methylmalonic acid level?**

A.

HEMATOLOGY

1. Mixing studies are done to distinguish between a clotting factor deficiency and an inhibitor of the clotting factor as the cause of an abnormal partial thromboplastin time (aPTT). You mix normal pooled plasma with the patient's plasma.
2. This is the best initial test when you have an abnormal aPTT.
3. If the test normalizes after the mixing, then the elevated aPTT is caused by a clotting factor deficiency.
4. The next best test if the mixing study normalizes is individual clotting factor assays of the patient's plasma to determine which factor is deficient.
5. If the test does not normalize it means that an inhibitor is present, i.e., Factor VIII inhibitor or the lupus anticoagulant.



HEMATOLOGY

Osmotic Fragility Test

- 1. What is it?**
- 2. How does it work?**
- 3. When is the answer osmotic fragility?**

A.

HEMATOLOGY

1. Osmotic fragility is the classic test for hereditary spherocytosis.
2. It measures the amount of hemoglobin released from red blood cells (RBCs) placed in hypotonic solution. RBCs with a reduced surface area-to-volume ratio will lyse at concentrations that do not affect normal cells. This is because they do not have enough cell membrane. They “stretch” and then “pop” when put in a hypotonic solution.
3. Answer osmotic fragility when you are presented with a case of hemolytic anemia and splenomegaly with spherocytes on the peripheral smear. The other features that push the diagnosis and this test are: family history of recurrent episodes of anemia, and bilirubin gallstones.



HEMATOLOGY

Philadelphia Chromosome

- 1. What is this?**
- 2. When is it the most accurate diagnostic test?**

A.

HEMATOLOGY

1. A Philadelphia chromosome represents a genetic translocation between chromosomes 9 and 22. It is associated with chronic myelogenous leukemia. It is also known as BCR/Abl and can be detected by PCR.
2. The answer is Philadelphia chromosome when you are presented a case of probable CML. The white cell count will be very high, mostly neutrophils, and the LAP (or leukocyte alkaline phosphatase) score will be low. The Philadelphia chromosome also has prognostic value. If you give imatinib (gleevec) and the Philadelphia chromosome goes away, the prognosis is good.



HEMATOLOGY

D-Dimer/Fibrin Split Products

- 1. What are they?**
- 2. How are they measured?**
- 3. What do they detect?**
- 4. What do the results tell you?**
- 5. When should you order them?**

A.

HEMATOLOGY

- 1.** D-dimer is the by-product of the degradation of fibrin by plasmin. Fibrin split products (FSPs) are produced by the activation of fibrinogen by thrombin. They are abnormal only if they are present in increased amounts.
- 2.** D-dimer can be measured by either latex agglutination (more rapid) or ELISA (more accurate). The ELISA is far more sensitive.
- 3.** Elevated levels indicate pathology involving clot formation and lysis from activation of the coagulation cascade. They provide no information about platelet function.
- 4.** Elevated D-dimer/FSP levels are evidence of DIC. A negative result of the ELISA rules out DVT and PE but a positive result does not confirm the diagnosis.
- 5.** Order these tests to confirm suspected DIC and to rule out PE in patients with a low pre-test probability.

Q. HEMATOLOGY

1. What is this?
2. What diseases are associated with it?
3. What is the most accurate test?
4. What is the therapy?



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KAPLAN
MEDICAL

A.

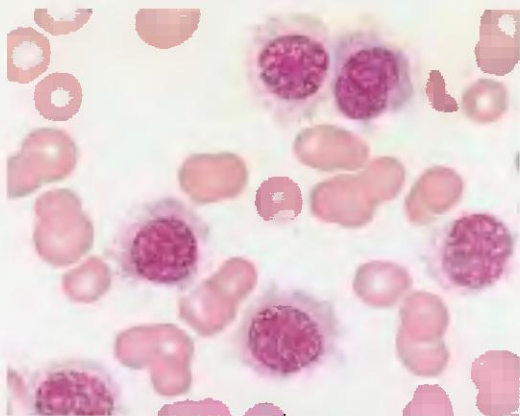
HEMATOLOGY

1. This is a hypersegmented neutrophil. Normal neutrophils contain an average of 3.5 lobes per cell. When the average is above 4 lobes, or there are 5% above 5 lobes, or a single 6-lobed cell, hypersegmentation is present. This is the defining feature of megaloblastic anemia.
2. Hypersegmented neutrophils or megaloblastic anemia is present with vitamin B12 and folate deficiency.
3. The most accurate test is B12 and folate levels. B12 deficiency is also confirmed with an elevated methylmalonic acid level. The etiology of B12 deficiency is confirmed with anti-intrinsic factor and antiparietal cell antibodies, which are the diagnostic test for pernicious anemia.

Q.

HEMATOLOGY

- 1. What does this blood smear show?**
- 2. When do you answer this?**
- 3. What is the most accurate diagnostic test?**



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KAPLAN
MEDICAL

A.

HEMATOLOGY

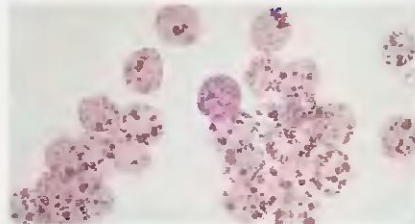
1. The blood smear shows cells with cytoplasmic projections consistent with hairy cell leukemia.
2. Look for a middle-aged man presenting with the gradual onset of fatigue. Splenomegaly is present and may be massive. The liver is enlarged in 50% of cases. **Pancytopenia** is the hallmark of hairy cell leukemia.
3. The most accurate test is tartrate-resistant acid phosphatase (TRAP). This is done on a bone marrow biopsy.

Q.

HEMATOLOGY

Peripheral Smear

1. What does the peripheral smear show?
2. When is this the answer?
3. What are the other cells characteristic of this disorder?
4. What is the definitive test for this disorder?



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HEMATOLOGY

1. This peripheral smear of red blood cells shows Heinz bodies. Heinz bodies are precipitated, oxidized hemoglobin. They are found in **glucose-6-phosphate dehydrogenase (G6PD) deficiency**. G6PD is an X-linked recessive disorder affecting 10–15% of African-American males.
2. Look for a man who was healthy until exposed to oxidant stress and suddenly develops intravascular hemolysis resulting in weakness, tachycardia, jaundice, and dark urine. The most common type of oxidant stress is from infection, not drugs. Drugs associated with this stress include sulfa drugs, primaquine, dapsone, quinidine, and nitrofurantoin. Fava beans also cause hemolysis.
3. Heinz bodies are removed, resulting in cells called **bite cells**.
4. The definitive test for this disorder is a G6PD level. You must wait 2 months to do the level, because the G6PD level will be artificially elevated immediately following a hemolytic event. All the most deficient cells are destroyed.

Q.

HEMATOLOGY

1. What is this?
2. What disease causes it?
3. When is it the answer?

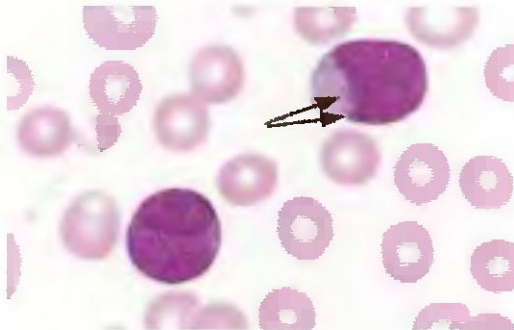


Image used courtesy of www.wadsworth.org/chemheme

A.

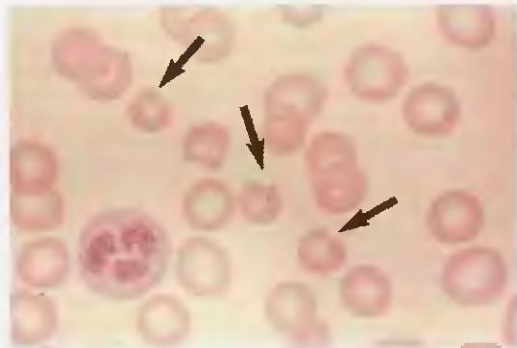
HEMATOLOGY

- 1.** This is an Auer rod. An Auer rod is an eosinophilic needle-shaped inclusion in the cytoplasm.
- 2.** Auer rods are pathognomonic for acute myelogenous leukemia (AML).
- 3.** Answer Auer rods when you are shown a patient with pancytopenia and blasts on the peripheral smear or greater than 20% blasts on bone marrow exam. Histochemical stains demonstrating myeloid enzymes such as peroxidase may further aid in choosing AML as the answer.

Q.

HEMATOLOGY

1. What are these?
2. What is the enzyme deficiency responsible for this condition?
3. What are the precipitating factors?



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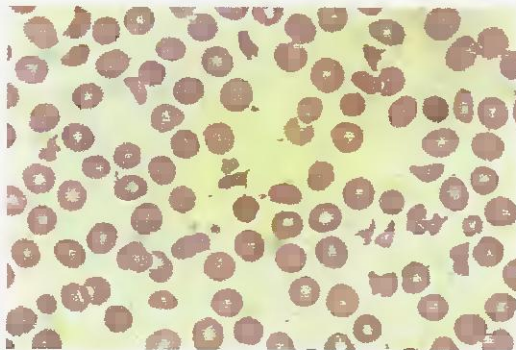
HEMATOLOGY

- 1.** These are bite cells. They are formed when Heinz bodies (denatured hemoglobin) are removed from the cells by the spleen. Macrophages in the spleen remove the denatured hemoglobin.
- 2.** Bite cells are seen with G6PD deficiency, which is an X-linked disorder. It is the most common enzymatic disorder of the red blood cells in humans.
- 3.** Patients with G6PD deficiency are prone to developing hemolytic anemia in response to sulfonamide drugs such as dapson and sulfasalazine. Other precipitating factors are infections, diabetic ketoacidosis, and Favism. Favism is the ingestion of fava beans resulting in hemolysis. This happens in the Mediterranean variant of G6PD deficiency.



HEMATOLOGY

- 1. What is this?**
- 2. What diseases are associated with it?**
- 3. What other abnormal lab tests are associated with it?**



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A.

HEMATOLOGY

1. These are fragmented red blood cells. The individual pieces are also known as schistocytes and helmet cells. Collectively, this is also known as intravascular hemolysis or microangiopathic hemolytic anemia.
2. Fragmented cells are seen in thrombotic thrombocytopenic purpura (TTP), hemolytic uremic syndrome (HUS), major blood group incompatibility, disseminated intravascular coagulation (DIC), paroxysmal nocturnal hemoglobinuria, artificial heart valves, and snake bites.
3. All forms of hemolysis are associated with an elevated LDH, indirect bilirubin, elevated reticulocyte count, and decreased levels of haptoglobin.

Q.

HEMATOLOGY

1. What is this?
2. What causes this?
3. Which hematological disorder is associated with this?



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A.

HEMATOLOGY

- 1.** This is a ringed sideroblast. Prussian blue stain is necessary in order to visualize it. The ringed sideroblast is caused by iron accumulation within mitochondria in the red cell. This is the main finding in sideroblastic anemia.
- 2.** Look for a case of microcytic anemia with an elevated serum iron level in an alcoholic. Acquired sideroblastic anemias can occur as a result of the ingestion of drugs such as alcohol, isoniazid, and chloramphenicol, or toxins such as lead or zinc.
- 3.** Ringed sideroblasts are also a feature of myelodysplastic syndrome.



HEMATOLOGY

1. What are these?
2. What diseases are associated with these?



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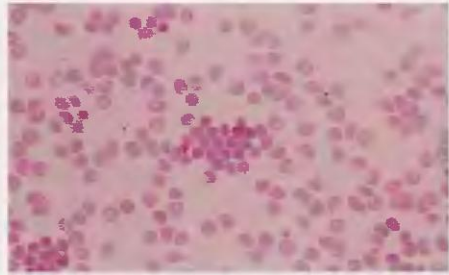
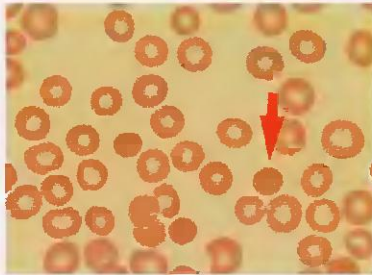
HEMATOLOGY

1. These are Rouleaux formations. They occur when red blood cells form stacks.
2. Rouleaux may form due to the presence of abnormal globulins or fibrinogen. This formation of the red blood cells is found in multiple myeloma and macroglobulinemia. Other clues that suggest multiple myeloma might be anemia, hypercalcemia, renal failure, and abnormal SPEP or UPEP.

Q.

HEMATOLOGY

1. What are these?
2. What is the most accurate diagnostic test?
3. What is the genetic defect?
4. When do you answer this test?



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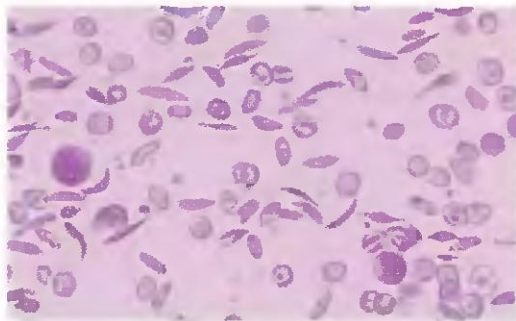
HEMATOLOGY

1. The peripheral smear shows spherocytes.
2. The most accurate test for hereditary spherocytosis is the osmotic fragility test. MCHC is **not** the most accurate test.
3. The defect is on the ankyrin gene, which leads to spectrin deficiency, which results in membrane instability.
4. Look for a patient with recurrent hemolysis, a big spleen, and a family history of anemia. The CBC reveals anemia and an elevated mean cell hemoglobin concentration (MCHC).



HEMATOLOGY

- 1. What is this?**
- 2. What diseases are associated with it?**
- 3. What is the most accurate test?**



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A.

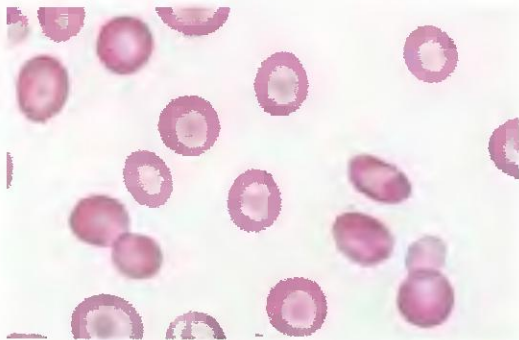
HEMATOLOGY

1. Sickled cells.
2. Only sickle cell disease that is homozygous (SS) will produce sickled cells. Heterozygous disease (AS) will be hematologically normal.
3. The most accurate test for sickle cell disease is a hemoglobin electrophoresis.

Q.

HEMATOLOGY

1. What are these?
2. What is the most accurate diagnostic test?
3. Do these cells have a shorter survival?



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A.

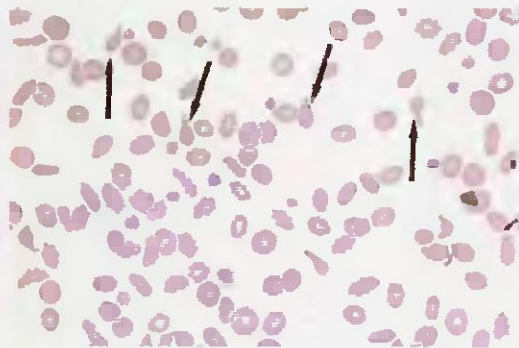
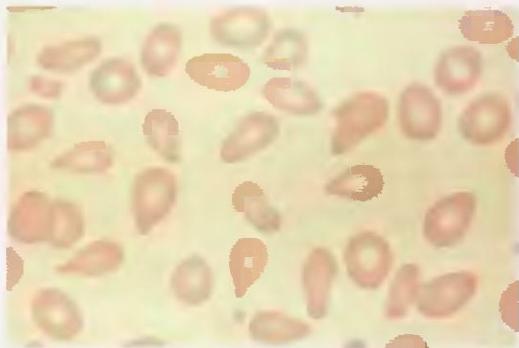
HEMATOLOGY

- 1.** These are target cells. These cells are associated with liver disease and certain hemoglobinopathies such as sickle cell disease, thalassemia, and, most notably, hemoglobin C disease. Iron deficiency can also have target cells.
- 2.** The most accurate test is a hemoglobin electrophoresis.
- 3.** Despite their abnormal appearance on peripheral smear, target cells do not have a shorter survival compared to normal cells.



HEMATOLOGY

1. What does the peripheral smear show?
2. When these cells are in the stem, what is the answer to the diagnostic question?



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HEMATOLOGY

1. The smears show teardrop cells.
2. When teardrop cells are either shown or described in the question, you should answer infiltrative bone marrow disease such as myelofibrosis. Look for a case of pancytopenia and massive splenomegaly in which hairy cell leukemia has been excluded. The bone marrow biopsy will show reticulin fibers.



HEMATOLOGY

Sucrose Lysis Test

- 1. What is this?**
- 2. When do you answer sucrose lysis test?**
- 3. What is the most accurate test?**

A.

HEMATOLOGY

- 1.** The sucrose lysis test is a screening test for paroxysmal nocturnal hemoglobinuria (PNH). A sample of the patient's blood is treated with sucrose and observed for evidence of hemolysis from complement activation. The hemolysis of PNH is caused by increased sensitivity of the patient's red cells to lysis by complement. Sucrose activates complement and evokes hemolysis.
- 2.** Answer sucrose lysis test if a patient presents with dark urine in the morning, with or without evidence of venous thrombosis and pancytopenia. The Coombs' test will be negative.
- 3.** The most accurate test for PNH is flow cytometry for the absence of CD55 and CD59, also known as decay-accelerating factor (DAF).



HEMATOLOGY

Serum Protein Electrophoresis (SPEP)

- 1. What is this?**
- 2. When is this the answer?**
- 3. What is the most common reason for an abnormality?**
- 4. What is the most accurate test?**

A.

HEMATOLOGY

- 1.** The SPEP is the separation and fractionation of the patient's serum proteins in order to assess the individual components, i.e., how much of the patient's protein is albumin, how much is immunoglobulin.
- 2.** Answer SPEP to evaluate a high total serum protein. SPEP is the best initial test to diagnose myeloma, particularly if an X ray of the bone looking for lytic lesions has already been done, or if X ray is not one of the answer choices.
- 3.** The most common reason to have an abnormality on the SPEP is a monoclonal gammopathy of unknown or undetermined significance.
- 4.** The most accurate test for an IgG abnormality detected as an SPEP spike is a bone marrow. A total of >10% plasma cells is indicative of myeloma. Waldenstrom's macroglobulinemia will also give an abnormal SPEP with an IgM spike.



HEMATOLOGY

Schilling's Test

1. For which clinical condition(s) is this test used?
2. How is this test performed?
3. When do you answer Schilling's test?

A.

HEMATOLOGY

1. Schilling's test is used to find the etiology of a B12 deficiency. The most common cause of B12 deficiency is pernicious anemia where there is decreased intrinsic factor (IF) due to autoantibodies against IF.
2. In the first stage, radiolabeled cyanocobalamine is given orally, followed by an intramuscular injection of cyanocobalamine 1 hour later. Urine is collected for determination of the percent excretion of the oral dose. In pernicious anemia, or malabsorption, excretion in the urine is low. The test is repeated with added oral intrinsic factor (IF). Adding IF should normalize cyanocobalamine absorption and urinary excretion in patients with pernicious anemia, but not in those with intestinal malabsorption.
3. Schilling's test is rarely the right answer. Look for a case of vitamin B12 deficiency when the intrinsic factor and parietal cell antibodies are negative and the etiology of the diagnosis is not clear or the antibodies are not in the choices. Schilling's test is to diagnose B12 deficiency when the diagnosis is not pernicious anemia.



HEMATOLOGY

Russell's Viper Venom Clotting Time (RVVT)

- 1. What is this?**
- 2. When is this indicated?**
- 3. What is a common clinical scenario?**

A.

HEMATOLOGY

1. RVVT is a phospholipid-dependent coagulation test.
2. It is used in detection of antiphospholipid antibodies or lupus anticoagulant. Think of this in a patient who has a prolonged PTT that does not correct with a mixing study. The dilute Russell viper venom test may be indicated to confirm that the inhibitor is a lupus anticoagulant.
3. Clinical scenario may be of a woman, with or without features of SLE, with repeated abortions or giving birth to an infant with heart block or presenting with venous or arterial thrombosis.



HEMATOLOGY

Ristocetin Cofactor Assay

- 1. What is this?**
- 2. When is this the answer?**

HEMATOLOGY

1. The Ristocetin cofactor assay is a test of the function of von Willebrand's factor (VWF). Along with a VWF level, it is the most accurate test for von Willebrand's disease. Ristocetin acts as an artificial endothelial lining. If VWF is present and is functioning normally then platelets should adhere to the Ristocetin.
2. Answer Ristocetin assay when you see a patient with platelet type of bleeding and a normal platelet count and normal VWF level. Platelet type of bleeding is superficial. Examples are epistaxis, petechiae, purpura, and gum or gingival bleeding.



HEMATOLOGY

Anti-Intrinsic Factor Antibodies ***Antiparietal Cell Antibodies***

- 1. What are they?**
- 2. When do you answer these antibody tests?**

HEMATOLOGY

1. Anti-intrinsic factor (anti-IF) antibodies and antiparietal cell antibodies are highly confirmatory for the diagnosis of pernicious anemia. They are nearly 100% specific for the disease. Pernicious anemia is an autoimmune disease in which you become “allergic” to your own IF and gastric parietal cells. You can’t absorb B12 without IF. You can’t make IF without parietal cells.
2. Answer anti-IF and antiparietal cell antibodies when you see a case of B12 deficiency and you want to determine the etiology. The case will describe a patient in whom the B12 level will be low or the methylmalonic acid level high. These antibodies are **not** to diagnose B12 deficiency, they are to determine the etiology.



HEMATOLOGY

Bleeding Time

- 1. What is it?**
- 2. How is it done?**
- 3. When is bleeding time the answer?**
- 4. What is the most accurate test?**

A.

HEMATOLOGY

- 1.** A test of the ability of the platelet to adhere to the endothelial lining of the capillary. Do not use it when the platelet count is abnormally low. Everyone with a low platelet count will have an abnormal bleeding time.
- 2.** A blood pressure cuff is inflated to 40 mm Hg to engorge the blood vessels, then small cuts are made. The test is the amount of time it takes for the bleeding to stop.
- 3.** Answer bleeding time when the patient has abnormal bleeding that seems to be from a platelet disorder but the platelet count is normal. Examples are Von Willebrand's disease or uremia-induced platelet dysfunction.
- 4.** The most accurate tests are a Von Willebrand's factor level, ristocetin cofactor assay, or in vitro platelet aggregation studies.



HEMATOLOGY

Burr Cells

- 1. What are they?**
- 2. What conditions are they associated with?**
- 3. How do you differentiate them from spur cells?**

A.

HEMATOLOGY

- 1.** Burr cells are red cells with many blunt, regular spicules. Burr cells are also called echinocytes.
- 2.** Burr cells are present in end-stage renal disease and liver disease.
- 3.** Spur cells, or acanthocytes, have only a few, irregular spicules. They are seen in severe liver disease and in some forms of hereditary spherocytosis and myelodysplasia.



HEMATOLOGY

Decay-Accelerating Factor (DAF) or CD55/CD59 Assay

- 1. What is this?**
- 2. When is this the most accurate diagnostic test?**
- 3. When do you answer DAF?**

A.

HEMATOLOGY

- 1.** CD55/59 is a test for paroxysmal nocturnal hemoglobinuria (PNH), also known as decay-accelerating factor. DAF is a membrane component of the complement system.
- 2.** Assay for DAF is the most accurate test for diagnosing PNH.
- 3.** Answer DAF when you see a patient with intermittent dark urine, particularly in the morning, pancytopenia, and large vessel thrombosis.



HEMATOLOGY

Cold Agglutinins

- 1. What is this?**
- 2. What diseases is it associated with?**
- 3. When do you answer cold agglutinins?**

A.

HEMATOLOGY

1. Cold agglutinins are IgM autoantibodies directed against RBC antigens. Titers are measured when **cold agglutinin disease**, which is a type of autoimmune hemolytic anemia, is suspected.
2. High titers have been found to be associated with malignancies such as lymphoma, CLL, and Waldenstrom's macroglobulinemia, as well as mycoplasma infections and infectious mononucleosis.
3. Answer cold agglutinins when you see a patient with hemolytic anemia as well as skin discoloration when exposed to cold temperatures. Do not confuse this with cryoglobulins, which give purpuric skin lesions and glomerulonephritis.



HEMATOLOGY

Coombs' Agglutinin Test

- 1.** What is this?
- 2.** What clinical significance does this test have?
- 3.** What is the most common cause?

HEMATOLOGY

1. Coombs' test measures the presence of antibodies against red cells.
2. Coombs' test is used for the **diagnosis of autoimmune hemolysis**. A positive Coombs' test shows the agglutination of the patient's red cells.
3. A total of 30–50% of Coombs' positive hemolytic anemia is idiopathic. The most common identified etiologies are penicillin, quinidine, alpramethyldopa, sulfa drugs, and aspirin.



NEPHROLOGY

1. What are these?
2. What is the most accurate test?
3. When is this the answer?



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NEPHROLOGY

1. The crystals pictured are “**enveloped-shaped**” **oxalate crystals**. They precipitate in the renal tubules when a toxic dose of ethylene glycol, a component of antifreeze, is ingested.
2. The most specific test for ethylene glycol intoxication is to determine the blood level. Urine can be examined under a fluorescent **Wood's light**, however urinary fluorescence lasts only a few hours after ingestion. Because the oxalic acid precipitates with calcium, the blood level of calcium is often low.
3. Answer ethylene glycol overdose and oxalate crystals when you see an elevated anion gap and metabolic acidosis. The question most often describes a depressed patient with a possible attempted suicide. Hypocalcemia can lead to QT prolongation and cardiac arrhythmias. Oxalate crystals deposit in the renal tubules and cause acute tubular necrosis.



NEPHROLOGY

Water Deprivation Test

- 1. What is this test for?**
- 2. How is it done?**
- 3. When is water deprivation test the answer?**

A.

NEPHROLOGY

1. Water deprivation test allows us to distinguish between the causes of **diabetes insipidus** (DI) and to objectively assess patients with hypernatremia and high urine output.
2. You restrict water intake for 12–24 hours with observation for the volume of urine, urine osmolality, and change in body weight to evaluate whether the kidneys are conserving or excreting water properly. If the urine volume stays elevated after the serum osmolality goes up, then it is DI. If there is a decrease in volume in response to giving vasopressin or ADH, then it is central DI. If there is no response, it is a nephrogenic DI.
3. When you see a case of hypernatremia and high urine output, answer water deprivation test as the best initial test.



NEPHROLOGY

Anti-Basement Membrane Antibodies (Anti-BM Antibodies)

- 1. What is this?**
- 2. When is this the answer?**
- 3. What is the most accurate diagnostic test?**

NEPHROLOGY

1. Anti-BM antibodies are indicative of Goodpasture's syndrome.
2. Answer anti-BM antibodies when you are shown a patient with hematuria and hypertension, accompanied by cough, shortness of breath, and hemoptysis. Renal insufficiency and red cells or red cell casts in urine are characteristic.
3. The most accurate test for Goodpasture's syndrome is a lung or kidney biopsy.



NEPHROLOGY

Total Complement Level (CH 50)

1. When do you answer CH 50?

NEPHROLOGY

1. Complement deficiency leads to recurrent bacterial infections. CH 50, or the total complement assay, is performed on a young patient with recurrent unexplained infections such as pneumonia, meningitis, sinusitis, etc., with encapsulated organisms such as *Neisseriae*, *S. pneumoniae*, and *H. influenzae*. The patient will have normal lymphocyte and immunoglobulin levels. An abnormal CH 50 assay indicates inherited or acquired **complement deficiency**.



NEPHROLOGY

Urine Microalbumin

- 1. What is this?**
- 2. When do you answer urine microalbumin?**
- 3. What is the treatment?**
- 4. What is a positive test?**
- 5. What is the most accurate test?**

A.

NEPHROLOGY

1. Microscopic urine albumin is a sensitive screening test for diabetic nephropathy.
2. Look for a case with diabetes for >5 years who has normal renal function and a negative urinalysis for protein. If the dipstick is already positive for albumin, there is no reason to look for microalbuminuria. Screening for microalbumin is done yearly in diabetic patients.
3. If the test is positive, you use ACE inhibitors or ARBs to prevent progression of the disease.
4. A negative test for microalbumin is <30 mg/day. Levels between 30 and 300 mg/day are called **microalbuminuria**. Levels above 300 mg would register as positive on the normal urinalysis.
5. The renal biopsy is the only test of the effect of diabetes on the kidney that is more sensitive than microalbuminuria.



EMERGENCY MEDICINE/SURGERY

Cystography (Voiding Cystography, Voiding Cystourethrography)

- 1. What is this?**
- 2. When do you answer cystography?**

EMERGENCY MEDICINE/SURGERY

1. Cystography is the radiographic visualization of bladder filling and emptying through the urethra. This is not to be confused with cystometrics, which is a pressure measurement of the bladder useful in the evaluation of incontinence. Cystography is an evaluation of the anatomy of the urogenital system.
2. Answer cystography in evaluating the following conditions:
 - **Trauma** to the bladder
 - **Neoplasia** in and surrounding the bladder
 - **Urinary tract infections** (UTIs) in children
 - All children younger than 5 years old with UTI
 - Children of any age with febrile UTI
 - Boys of any age with UTI



EMERGENCY MEDICINE/SURGERY

Intravenous Pyelogram

1. For which clinical condition would you answer this test?
2. What is the most accurate test?

A.

EMERGENCY MEDICINE/SURGERY

1. Intravenous pyelogram (IVP) is an old test of virtually no clinical utility and is almost always a wrong answer. In an IVP, intravenous contrast is injected and multiple X rays are taken to look for radiographic visualization of the renal infrastructure (calices, pelvis, and ureter). This makes the test slow. It was used in the evaluation of a patient with renal colic when no stones were found on radiograph.
2. The IVP has been replaced by the renal ultrasound as the best initial test and the CT scan as the most accurate test. If an ultrasound or CT scan is in the answer, then the IVP is **never** correct. The IVP uses contrast, which has a risk of both renal failure and allergic reaction. The CT scan is much faster, is more sensitive, and does **not** use contrast when looking for stones.



EMERGENCY MEDICINE/SURGERY

Renal Ultrasound

- 1. For which clinical conditions is this test commonly used?**
- 2. When do you answer renal ultrasound?**

EMERGENCY MEDICINE/SURGERY

1. Renal ultrasound is the best initial test for:

- Kidney stones
- Congenital renal malformations
- Pediatric tumors
- Recurrent urinary tract infections
- Chronic renal failure
- Renal artery stenosis
- Polycystic kidney disease

2. Answer renal ultrasound when you see a patient with unexplained hematuria or flank pain and tenderness.

Answer renal ultrasound when you see a patient with dysuric symptoms such as frequency and burning, the urinalysis has white blood cells, and there is flank pain.



EMERGENCY MEDICINE/SURGERY

Right Upper Quadrant Ultrasound

- 1.** For which clinical scenarios is this test the right answer?
- 2.** What is the most accurate test?
- 3.** What if the patient experiences pronounced tenderness when performing the RUQ US?

A.

EMERGENCY MEDICINE/SURGERY

1. Right upper quadrant ultrasound is the answer when the patient presents with **right upper quadrant pain, with or without fever**. The ultrasound will evaluate hepatobiliary structures for the following diseases:
 - *Liver pathology:*
 - Masses (tumor, abscess, cysts)
 - Portal hypertension
 - *Gallbladder and biliary tree*
 - Cholelithiasis
 - Cholecystitis
 - Choledocholithiasis
 - Cholangitis
2. The **most** accurate test for biliary pathology is the ERCP or MRCP. The most accurate test for liver pathology is the liver biopsy.
3. If there is tenderness when the transducer presses against the abdomen, this is a positive Murphy's sign. This is highly suggestive of acute cholecystitis.



EMERGENCY MEDICINE/SURGERY

Skull X Rays

- 1.** What abnormalities do they detect?
- 2.** What do they miss?
- 3.** When the patient has been hit in the head, when are skull X rays the right answer?

A.

EMERGENCY MEDICINE/SURGERY

1. Skull X rays can detect fractures of the skull. They can also detect lytic and blastic lesions such as from bony metastases or Paget's disease.
2. Skull X rays are incapable of detecting intracranial bleeding. They provide **no** information on brain or cerebral structure.
3. For a patient who has experienced head trauma, skull X rays are always the wrong answer. When there is a head trauma case, skull X rays may be in the answer, but do **not** choose them.



EMERGENCY MEDICINE/SURGERY

Pelvic Ultrasound Transvaginal Ultrasound

1. When do you answer these?

EMERGENCY MEDICINE/SURGERY

1. Pelvic ultrasound is indicated in the following scenarios:

- Pelvic or lower abdominal pain with amenorrhea or vaginal bleeding.
- Suspected pregnancy
- Suspected ectopic pregnancy

Transvaginal ultrasound is superior to transpelvic ultrasound in:

- Placenta previa (painless vaginal bleeding in the third trimester)
- Fetal monitoring in the first trimester
- Obese women in examining pelvic anatomy

Q.

EMERGENCY MEDICINE/SURGERY

1. What does this X ray show?
2. When is this type of X ray the answer?



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KAPLAN
MEDICAL

A.

EMERGENCY MEDICINE/SURGERY

1. This is an upright X ray of the chest. The usual chest film is done with the patient sitting up so it can show air accumulated under the diaphragm.
2. An upright chest X ray is the answer when you suspect the perforation of an abdominal organ. This can be in association with ulcer disease, penetrating trauma to the abdomen, or rupture secondary to diverticulitis, appendicitis, other infections, or iatrogenically from endoscopy.



EMERGENCY MEDICINE/SURGERY

Skeletal Survey

- 1. What is this?**
- 2. When do you answer skeletal survey?**

A.

EMERGENCY MEDICINE/SURGERY

1. Skeletal survey is a radiographic study of the entire skeleton.
2. Skeletal survey is used with the suspicion of **child abuse, multiple myeloma, and metastatic bone tumors.**

Example

- 8-year-old falls from chair
- Multiple bruises on arms and legs
- Suspect child abuse and get **skeletal survey**



[This image shows a fractured clavicle.]



EMERGENCY MEDICINE/SURGERY

Diagnostic Peritoneal Lavage (DPL)

- 1. When do you answer DPL?**
- 2. For which patients should you not answer DPL?**
- 3. What is the abnormality you find on DPL that makes it positive?**
- 4. What does DPL miss?**

A.

EMERGENCY MEDICINE/SURGERY

1. Look for the drunk or unconscious patient who cannot have his abdomen examined reliably with multiple trauma and unexplained shock. A catheter is inserted into the abdomen and saline is infused, aspirated, and examined.
2. The following scenarios are **not** appropriate for evaluation with DPL:
 - Patient with signs of **acute abdomen**. Any indication of perforated viscus or intraabdominal bleed is an indication for **immediate surgical exploration**.
 - Patient with **gunshot wound** to the abdomen. Is indication for **immediate surgical exploration**.
 - Hemodynamically stable patient with history of abdominal trauma but no definite signs of viscus perforation on physical exam. Abdominal **CT** is indicated **here**.
3. To be considered positive a DPL should show RBC count $>100,000/\text{mm}^3$, WBC $>500/\text{mm}^3$, bile, or feces.
4. DPL is inadequate to diagnose retroperitoneal injuries.



EMERGENCY MEDICINE/SURGERY

Pelvic Laparoscopy

- 1. What is this?**
- 2. When do you answer pelvic laparoscopy?**

EMERGENCY MEDICINE/SURGERY

1. Pelvic laparoscopy is used for direct visualization of pelvic structures and is the most accurate test in the following conditions:
 - Ectopic pregnancy
 - Pelvic inflammatory disease
 - Endometriosis
 - Pelvic cyst
 - Chronic pelvic pain
2. Answer pelvic laparoscopy when you see a woman who presents with pelvic pain, vaginal bleeding, and a positive β hCG. This is particularly true if the level of β hCG is low for the estimated gestational age.

Answer pelvic laparoscopy when you are shown a case of lower abdominal pain in a woman treated for pelvic inflammatory disease with an incomplete response in whom pregnancy is excluded.



EMERGENCY MEDICINE/SURGERY

Diagnostic Abdominal Laparoscopy (DAL)

- 1. What is this?**
- 2. When do you answer DAL?**

A.

EMERGENCY MEDICINE/SURGERY

1. Diagnostic abdominal laparoscopy (DAL) is used for direct visualization of abdominal structures in the following conditions:

- Ascites of unclear etiology
- Liver disease with an inconclusive biopsy
- Staging of abdominal cancer

2. In a trauma patient:

This modality may be used in stable patients as a less invasive alternative to laparotomy. DAL is especially useful in investigating injuries to the diaphragm.

Look for a case of a victim of a motor vehicle accident in whom the abdominal CT scan is nondiagnostic and organ damage is suspected.



EMERGENCY MEDICINE/SURGERY

Prenatal Screening

- 1. What tests does prenatal screening include?**
- 2. Which tests are specifically appropriate for high-risk pregnancies or mothers over 35?**

EMERGENCY MEDICINE/SURGERY

1. Basic prenatal screening is appropriate in **all pregnancies**. These tests include:
 - Cervical cytology
 - CBC
 - Urinalysis
 - Blood group, RH factor, and antibody
 - Serology for syphilis
 - Rubella antibody
 - Glucose screening
 - Fetal ultrasound
 - Cervical Culture for
 - Neisseria
 - Group B streptococci
 - Chlamydia trachomatis
2. In a woman over 35, answer chromosomal screening for fetal abnormalities.



ENDOCRINOLOGY

C-Peptide

- 1. What is this test?**
- 2. What do low values represent in a patient with hypoglycemia?**
- 3. What do high values represent?**
- 4. When do I answer C-peptide level?**

ENDOCRINOLOGY

- 1.** Serum measurement of C-peptide is the best test to distinguish endogenous from exogenous hyperinsulin in patients with hypoglycemia.
- 2.** Low values of C-peptide in patients with hypoglycemia represent factitious insulin injection. The patient is abusing insulin.
- 3.** High C-peptide values represent endogenous insulin production, such as that induced by sulfonylureas or from an insulinoma.
- 4.** Look for a patient with unexplained hypoglycemia, high insulin level, and multiple hospital visits. Answer C-peptide as the next best step to determine the etiology.



ENDOCRINOLOGY

Oral Glucose Tolerance Testing

- 1. What is this?**
- 2. What constitutes a positive test?**
- 3. When is this the most accurate diagnostic test?**

ENDOCRINOLOGY

- 1.** An oral glucose tolerance test is the measurement of serum glucose levels at baseline and 2 hours after the ingestion of an oral load of 75 grams of glucose.
- 2.** A positive test means that the glucose level 2 hours after the ingestion of the oral glucose load is >200 mg%. This is one of the methods of diagnosing diabetes. The ordinary method is to find two fasting glucose levels to be >126 mg/dl.
- 3.** The strongest indication for an oral glucose tolerance test is in screening for diabetes during pregnancy. Because of the short duration of pregnancy, the potential for marked worsening over a short period of time, and the harmful effects of diabetes on the fetus, this is the single most urgent time to make a prompt diagnosis of diabetes. Oral glucose tolerance testing is like putting your pancreas on a treadmill to evoke subtle amounts of disease not detected by the ordinary test.



ENDOCRINOLOGY

Beta-Human Chorionic Gonadotropin (B-hCG)

- 1. What is this?**
- 2. When is B-hCG the answer?**

ENDOCRINOLOGY

1. B-hCG is a pregnancy test.
2. Urine and/or serum measurement of B-hCG is the best initial test for **any woman of reproductive age complaining of a missed period (amenorrhea), delayed period, vaginal bleeding, or abdominal pain.** Any unexplained abdominal pain in a woman is an ectopic pregnancy until you have the B-hCG.



ENDOCRINOLOGY

IGF-1 (Insulin-like Growth Factor-1)

- 1. For which disease(s) is this the single best test for diagnosis?**
- 2. What is the substance?**
- 3. What is the best test to confirm the diagnosis?**
- 4. What is the most common wrong answer for the best confirmatory test?**

ENDOCRINOLOGY

1. Serum measurement of IGF-1 is the best initial test for acromegaly.
2. IGF-1 is a somatomedin secreted from the liver. Growth hormone when combined with thyroid hormone stimulates linear skeletal growth in children **through** IGF-1. It stimulates protein synthesis in muscle (anabolic effect) in children and the release of fatty acids from adipose tissue (catabolic effect) in adults. Growth hormone secretion is pulsatile, has a short half-life, and reaches maximal life in the middle of the night. A single test of the GH level is not accurate. IGF-1 levels are more stable and reliable.
3. The best confirmatory test for acromegaly is the oral glucose tolerance test. Glucose normally suppresses GH. In acromegaly glucose does **not** suppress GH.
4. The most common wrong answer is GH (growth hormone) levels.



ENDOCRINOLOGY

- ***TSH***
- ***Thyroxine (T4)***
- ***Thyroglobulin***

1. For which clinical scenario(s) are these tests used?
2. What are these substances?
3. When do you answer TSH and thyroxine (T4)?
4. When do you answer thyroglobulin?

ENDOCRINOLOGY

1. Serum levels of thyroid-stimulating hormone (TSH) and thyroxine (T4) are measured to assess **thyroid function** (both hypofunction and hyperfunction). Thyroglobulin is used to **monitor recurrence** in patients who have been treated for papillary or follicular cancer of the thyroid.
2. TSH is produced by the pituitary to stimulate the thyroid. T4 is one of the principal metabolism-inducing hormones produced by the thyroid gland, and thyroglobulin is an iodine-containing glycoprotein synthesized by the thyroid gland from which thyroxine (T4) is derived. Thyroglobulin is the storage form of thyroid hormone. **Thyroid-binding** globulin is the transport protein.
3. TSH and T4 are always the **best initial test** for thyroid diseases.
4. Thyroglobulin is to follow the response to the treatment of thyroid cancer.



ENDOCRINOLOGY

24-Hour Urine Cortisol Level

- 1. For which diagnosis(es) is this the most sensitive test?**
- 2. What is this substance?**
- 3. When do you answer urinary free cortisol?**

ENDOCRINOLOGY

1. When collected for 24 hours, urinary cortisol excretion is the most sensitive indicator of endogenous hypercortisolism and is the most sensitive test for **Cushing's syndrome**.
2. Cortisol is a glucocorticoid hormone produced in the adrenal cortex.
3. Look for a question with a case with truncal obesity, "buffalo hump," striae, and easy bruising. Answer either 24-hour urine cortisol or overnight dexamethasone suppression test as the best initial test.



ENDOCRINOLOGY

ACTH (Cosyntropin) Stimulation Test

- 1. What is this?**
- 2. When do you answer an ACTH stimulation test?**

ENDOCRINOLOGY

1. The ACTH stimulation (cosyntropin) test evaluates adrenal function and is the best test for **adrenal insufficiency**. Baseline cortisol levels are taken, then ACTH is administered and follow-up cortisol levels monitored. If cortisol is low, think primary adrenal insufficiency. If cortisol levels rise, the adrenal gland is functioning.
2. Look for a fatigued patient with skin hyperpigmentation, hyperkalemia, slight metabolic acidosis, and a taste for pickle juice (high salt content). Also look for an ICU patient with unexplained hypotension.



ENDOCRINOLOGY

- ***Antimicrosomal Antibodies***
- ***Antithyroid Peroxidase (anti-TPO) Antibodies***
- ***Antithyroglobulin Antibodies***

1. What are they?
2. When are they the answer?
3. Do you expect high or low values?

ENDOCRINOLOGY

1. These antibodies are associated with Hashimoto's thyroiditis and Graves' disease. If hypothyroid, if they are positive, you will move straight to treatment with synthroid because the etiology of the hypothyroidism has been confirmed.
2. They are the answer once you have proven hypo- or hyperthyroidism. They are not to diagnose the thyroid function state. They are to confirm the autoimmune etiology of thyroid state.
3. You expect the levels to be high with autoimmune thyroiditis. This is whether the person is hypo- or hyperfunctioning. Nutritional problems and synthroid abuse will give low levels of the antibodies.



ENDOCRINOLOGY

24-Hour Urine for Metanephrine, Vanillylmandelic Acid (VMA), and Catecholamines

- 1. For which condition is this the best initial test?**
- 2. If positive, what is the next best imaging test?**
- 3. If all imaging done is negative, what would you do next?**
- 4. This disease is associated with which syndrome?**
- 5. When do you answer VMA, metanephrines, or catecholamines?**

ENDOCRINOLOGY

1. Twenty-four-hour urine collection for metanephrine, vanillyl-mandelic acid (VMA), and catecholamines is the best initial test for **pheochromocytoma**.
2. If the question says the VMA or catecholamines are elevated, then answer CT or MRI of the adrenal glands as the next best test to find the pheochromocytoma.
3. If CT/MRI find nothing, a metaiodobenzylguanidine (MIBG) scintigraphy would be the next best option. This is a nor-epinephrine analogue that concentrates in the adrenals and pheochromocytomas.
4. Pheochromocytoma is associated with MEN II and MEN III.
5. Look for a case of episodic hypertension, particularly with flushing and diarrhea.



ENDOCRINOLOGY

Venous Blood Gas (VBG)

1. When do you answer VBG?

A.

ENDOCRINOLOGY

1. Use the venous blood gas (VBG) for the follow-up of diabetic ketoacidosis (DKA). A VBG could replace the arterial sample for assessing the degree of acidosis and hypocarbia when all you need is pH and not the pO_2 while avoiding an additional painful procedure.



ENDOCRINOLOGY

RAIU (Radioiodine Uptake)

- 1. For which disease(s) is this test the right answer?**
- 2. When do you expect uptake to be high?**
- 3. When do you expect uptake to be low?**
- 4. When do you answer RAIU (I^{121}) scan?**

ENDOCRINOLOGY

1. The measurement of orally ingested radioactive iodine (I^{121}) that accumulates in the thyroid gland is used to differentiate **Graves'/toxic multinodular goiter** from **Thyroiditis/Factitious**.
2. RAIU is increased in Graves' disease and with hot nodules (toxic multinodular goiter, toxic solitary nodule).
3. RAIU is decreased when thyroiditis induces a thyrotoxic state or when a person is abusing thyroid hormone (thyroiditis factitia).
4. Answer RAIU scan when the question shows a case of hyperthyroidism. **The question will include a high T4 level, for instance, and will ask you the next best step to determine the etiology.**



ENDOCRINOLOGY

Pro-Insulin

- 1. What is this test for?**
- 2. What do high levels of pro-insulin represent?**
- 3. When do I answer pro-insulin levels?**

ENDOCRINOLOGY

1. Pro-insulin assay is used to distinguish autoimmune causes of hypoglycemia from **insulinoma**.
2. High levels of pro-insulin represent insulinomas.
3. Answer a pro-insulin level when you see a case of recurrent fasting, hypoglycemia, symptoms of weakness, and high C-peptide levels.

Q. ENDOCRINOLOGY

Progesterone Challenge

- 1. For which clinical scenario(s) is this the best test?**
- 2. If bleeding occurs after the challenge, it indicates what?**
- 3. What is the next best test if the bleeding occurs?**
- 4. If there is no bleeding what is the next best test?**

ENDOCRINOLOGY

1. Oral dosing of progesterone of 10 mg daily for 5 days is used in amenorrheic women after pregnancy is excluded to determine if the cause of amenorrhea is due to outflow tract obstruction or secondary to the hypothalamus and pituitary. Look for a woman who has no periods and a negative hCG.
2. If bleeding occurs following the challenge, it indicates that there is adequate estrogen and that the outflow tract exists.
3. The next best test is to check FSH, LH, prolactin, and TSH to rule out a hypothalamic or pituitary etiology.
4. If there is no bleeding, the next best test is to evaluate for an outflow tract obstruction with ultrasound, and with MRI if ultrasound is not definitive.



ENDOCRINOLOGY

Metaiodobenzylguanidine (MIBG) Scan

- 1. What disease is this test for?**
- 2. How is the test done?**
- 3. When do you answer MIBG scan?**

ENDOCRINOLOGY

1. Metaiodobenzylguanidine (MIBG) scanning is used to detect occult pheochromocytoma if the blood and urine testing (VMA, catecholamines, metanephrines) are positive and the scans are nondiagnostic.
2. MIBG is injected into the body. MIBG is an agent similar to norepinephrine and should be taken up by adrenergic tissue. The MIBG scan allows visualization of potential adrenal masses.
3. Answer MIBG scan when you see a patient with palpitations, intermittent tachycardia, and biochemical evidence of pheochromocytoma (e.g., catecholamines, metanephrines) when the CT and MRI can't visualize the lesion. You can't remove a pheochromocytoma and cure it if you can't find where it is.



ENDOCRINOLOGY

5-HIAA

- 1. What is this?**
- 2. When do you answer 5-HIAA level?**
- 3. What is the most accurate diagnostic test?**

A.

ENDOCRINOLOGY

1. A 24-hour urine level of 5-HIAA is the best initial diagnostic test for **carcinoid syndrome**. 5-HIAA is the end-product of serotonin metabolism.
2. Look for a patient with episodic diarrhea and/or hypotension associated with unexplained flushing and wheezing.
3. The most accurate test for carcinoid syndrome is a biopsy. Although CT and MRI scanning can localize the disease, they are not as accurate as the tissue diagnosis you obtain from a biopsy.



ENDOCRINOLOGY

17-Hydroxyprogesterone Level

- 1. What is this?**
- 2. When do you answer it?**

ENDOCRINOLOGY

1. 17-hydroxyprogesterone level is the best initial test to diagnose 21-hydroxylase deficiency or congenital adrenal hyperplasia.
2. Answer 17-hydroxyprogesterone in a patient presenting with one of the following syndromes:
 - Female infant with ambiguous genitalia (simple virilizing)
 - Infant with hyponatremia, hyperkalemia, and hypotension (salt-wasting syndrome)
 - Young woman with hirsutism, acne, and irregular menses
 - Child with precocious puberty



ENDOCRINOLOGY

Fine-Needle Aspiration of the Thyroid

- 1. What is this?**
- 2. When is this the most accurate test?**
- 3. When is this the wrong answer?**

ENDOCRINOLOGY

1. A sample of thyroid cells collected by a needle inserted into the thyroid is the initial test for **all solitary nodules unless** the patient is thyrotoxic.
2. Look for a case with a palpable nodule and normal thyroid function tests and the question asks for the next step in diagnosis.
3. This is the wrong answer in patients with a solitary nodule who are thyrotoxic. In such patients a SCINTISCAN (I^{121} scan) should be done first to see if the nodule is hyperfunctioning (hot) or hypofunctioning (cold). Hyperfunctioning modules are almost never malignant.



DERMATOLOGY

Diascopy

- 1. For which clinical condition(s) is this test commonly used?**
- 2. What do you look for?**

A.

DERMATOLOGY

1. Diascopy is the best initial test for erythematous lesions. It is a fancy way to see if the lesion blanches (turns white) when pressed. Diascopy, where a clear plastic glass slide is pressed over the skin, is used to **determine if an erythematous skin lesion is due to vasodilatation or extravasation of RBCs via damaged blood vessels.**
2. If the skin blanches with diascopy, the erythema is caused by vasodilatation. Simple vasodilation is caused by viral diseases, drug reactions, and insect bites. If the lesion persists under diascopy, the redness is caused by extravasation of erythrocytes via damaged blood vessels, as seen with vasculitic and purpuric lesions.



A cutaneous B-cell lymphoma exhibited an intense violaceous color on diascopy. Image used courtesy of www.DermAtlas.org



DERMATOLOGY

Excision Skin Biopsy

- 1. For which clinical scenario(s) is this diagnostic tool indicated?**
- 2. For which condition is this test always the right answer?**

DERMATOLOGY

1. Excision biopsy is a skin biopsy technique where the full thickness of a lesion is removed, preferably intact.
2. Excision biopsy is always the right answer for the workup of a lesion suspected of being a **malignant melanoma**.

NOTE: Melanoma cannot be properly staged if partially removed.



Image used courtesy of the National Cancer Institute,
NIH, Bethesda, MD, USA.



DERMATOLOGY

Fungal Culture

- 1. For which clinical condition(s) is this the most accurate test?**
- 2. When is this test the best initial step?**
- 3. What is the management?**

DERMATOLOGY

1. Direct immunofluorescence (DIF) of skin biopsy samples is used to **diagnose skin disorders of immunologic origin**. The DIF test looks for the presence and staining pattern of immunoglobulins (IgG, IgM, IgA), C3, and fibrinogen in the skin. For example, it is useful for differentiating between pemphigus vulgaris and bullous pemphigoid.

2. Pemphigus vulgaris



IgG and C3 between epidermal cells

Bullous pemphigoid



IgG and C3 at dermo-epidermal junction

Images used courtesy of the University of Bristol BioMed Image Archive.



DERMATOLOGY

Direct Immunofluorescence (Skin)

- 1. For which clinical scenario(s) is this the best test?**
- 2. What is seen under the microscope?**

DERMATOLOGY

1. A fungal culture is the most accurate test for diagnosing **superficial fungal infections** of the body. Examples are tinea, onychomycosis, and fungal vaginitis.
2. **Never**; although a culture is very accurate, **it is never the best initial test**. A fungal infection is diagnosed primarily by visual appearance and confirmed by KOH prep.
3. Depending on the location of the infection, topical or oral antifungals are the management of choice. Onychomycosis (nail bed) and tinea capitis (scalp) need to be treated with oral antifungals (terbinafine or itraconazole). All of the other fungal infections of the skin may be treated with topical medications such as ketoconazole, clotrimazole, nystatin, or ciclopirox.



DERMATOLOGY

Skin Scraping and Mineral Oil Mount

- 1. What is this?**
- 2. When is this the answer?**
- 3. What is an adjuvant test often used in the same scenario?**

A.

DERMATOLOGY

1. The skin scraping and mineral oil mount is used to aid in the diagnosis of **scabies**. Mineral oil is applied over the suspected lesion to enhance the viewing of a burrow. The skin is scraped and viewed under the microscope. The skin cells remain intact, mite feces are preserved, and the mites remain motile and alive in mineral oil.
2. Look for a patient with an itchy (pruritic) skin rash. There will be small “burrows” visible, particularly in the web spaces of the hands and feet. There may also be a history of sexual contact and genital or breast involvement as well.
3. A KOH wet mount is prepared from the skin scrapings and the slide is heated, breaking up the tissue to reveal any mites hiding under a lump of squamous cells.



DERMATOLOGY

Patch Testing

- 1. For which clinical scenario(s) is this test indicated?**
- 2. What important distinction must be made before utilizing this test?**

DERMATOLOGY

1. Patch testing is used to **determine the allergen responsible for allergic contact dermatitis** after conservative measures like removing the supposed offending agent and a trial of topical therapy fail.
2. It is important to determine if the patient's contact dermatitis is caused by an irritant or an allergy.

NOTE: Patch testing is not useful for irritant contact dermatitis because irritant dermatitis is **not** an immunologically mediated response.



DERMATOLOGY

Wood's Light Examination

- 1. What is this?**
- 2. What are some organisms that will fluoresce under Wood's light?**

DERMATOLOGY

1. A Wood's light examination uses a UV light to diagnose certain **infections of the skin caused by yeast, bacteria, or dermatophytes**. It is also used to detect pigment changes in the skin. For example, it detects loss of pigment in fair-skinned individuals affected with a depigmentation disorder, such as vitiligo.
2. The following organisms fluoresce:
 - The yeast *Pityrosporum ovale* will fluoresce **yellow**.
 - The bacterium *Corynebacterium minutissimum* will fluoresce a bright coral red.
 - The dermatophyt *Microsporum canis* will fluoresce **blue-green** in the scalp but not on glabrous skin. However, in the United States, **tinea capitis** is most commonly caused by *Trichophyton tonsurans*, which does not fluoresce under Wood's light.

Q. RHEUMATOLOGY

Arthrocentesis

- 1. What is this?**
- 2. When do I answer arthrocentesis?**
- 3. What findings are evident in the two synovial fluid samples pictured here?**



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RHEUMATOLOGY

1. Arthrocentesis is a needle aspirate of synovial fluid for microscopic analysis. The cell count is the most accurate way of telling immediately if there is an infection versus inflammation. Counts from 0 to 2,000 are normal; from 2,000 to 20,000 are from inflammatory disorders such as gout. Counts above 50,000 are from infections. Counts between 20,000 and 50,000 are indeterminate.
2. Look for a patient with the new onset of a joint that is warm to touch, painful, and swollen from an effusion with decreased mobility. In gout, the serum uric acid may be elevated.
3. The slides depicted here are indicative of the following:
 - a. **Gout:** Negatively birefringent needle-shaped crystals. These are monosodium urate crystals.
 - b. **Pseudogout:** Positively birefringent rhomboid-shaped crystals.



RHEUMATOLOGY

Anticentromere Antibodies

- 1. What condition is it associated with?**
- 2. When do you answer anticentromere antibodies?**

A.

RHEUMATOLOGY

1. Anticentromere antibodies are specific for CREST syndrome. CREST is calcinosis, Raynaud's phenomenon, esophageal dysmotility, sclerodactyly, and telangiectasia. Antitopoisomerase (SCL-70) is specific for the systemic disease (systemic sclerosis).
2. Answer anticentromere antibodies as the "best initial test" when you see a female 30 to 50 years of age with positive rheumatoid factor and a positive ANA.



RHEUMATOLOGY

ANA, Double-Stranded DNA, and Anti-Sm Antibodies

- 1. What diseases are they associated with?**
- 2. When do you answer this?**

RHEUMATOLOGY

1. ANA is more than 98% sensitive for SLE but ANA is not specific for SLE. A negative ANA excludes SLE with a 98% negative predictive value. Anti-ds-DNA antibodies are 99% specific for SLE. Anti-Smith antibodies are extremely specific for lupus.
2. Answer ANA, anti-Sm and ds-DNA when you see a young female with multiple spontaneous abortions (lupus anticoagulant), rash, and joint pains.



RHEUMATOLOGY

DEXA Scanning

- 1. What does it show?**
- 2. When do you answer DEXA scan?**
- 3. What is the treatment?**

RHEUMATOLOGY

1. DEXA scan is used to diagnose osteoporosis. DEXA scanning is used to detect decreased bone density when compared to the general population.
2. Answer DEXA scanning for postmenopausal women or patients with high cortisol states like Cushing's syndrome, exogenous steroid use, hyperthyroidism, or with hyperparathyroidism.
3. Treatment is with estrogens, bisphosphonates, and SERM such as raloxifen and tamoxifen.



RHEUMATOLOGY

Muscle Biopsy

- 1. For which clinical condition(s) would you use this test?**
- 2. When do you answer muscle biopsy?**
- 3. For which muscle diseases would you not answer muscle biopsy?**

RHEUMATOLOGY

1. Muscle biopsy is used to diagnose a suspected myopathy such as:
 - Glycogen storage diseases
 - Mitochondrial gene malformations
 - Dystrophinopathies (Duchenne's/Becker's)
 - Dermatomyositis/polymyositis
2. Answer muscle biopsy when you see proximal muscle weakness described as "weak shoulder abduction" or "weakness rising from a chair." This is usually associated with myalgia (muscle soreness) and other signs of myopathy such as recurrent rhabdomyolysis. There may also be a family history of a similar problem because many muscle disorders are inherited.
3. Although somewhat similar in presentation because of the weakness you should **not** answer muscle biopsy with:
 - Endocrine-related myopathies (thyroid/diabetes)
 - Do specific endocrine tests
 - Neuropathies: (i.e., myasthenia gravis)
 - Do edrophonium testing, anti-acetylcholine receptor antibodies, or electromyogram



RHEUMATOLOGY

Rheumatoid Factor

- 1. What disease is it associated with?**
- 2. When do we answer it?**

RHEUMATOLOGY

- 1.** Rheumatoid factor (RF) is present in more than 70% of patients with rheumatoid arthritis (RA), however RF is not specific for RA.
- 2.** Answer RF when you are presented with a woman with symmetric inflammatory arthritis that is worse in the morning, affecting wrists, MCP, and PIP joints. Look for an elevated ESR or synovial fluid with an elevated white count between 2,000 and 20,000 cells.



RHEUMATOLOGY

Aldolase

- 1. What is it associated with?**
- 2. When do you answer aldolase?**
- 3. What is the most accurate test?**

RHEUMATOLOGY

- 1.** Aldolase is released from damaged skeletal muscle and is elevated in inflammatory myopathies such as polymyositis and dermatomyositis. Creatinine and CPK are also elevated.
- 2.** Look for a case of an older woman with difficulty rising from a chair. There may be a heliotrope rash and Gottron's papules. Aldolase, or CPK, is the answer to the question "What is the best initial diagnostic test?"
- 3.** The most accurate tests are the electromyogram and the muscle biopsy. These confirm the diagnosis of polymyositis and dermatomyositis when the aldolase is elevated.



RHEUMATOLOGY

Allergy Testing

1. For which clinical scenario is this test used?
2. When is it contraindicated?
3. What medication must be stopped before allergy testing?

A.

RHEUMATOLOGY

1. Allergy testing is the subdermal exposure to trace amounts of suspected allergens with subsequent visual inspection for signs of hypersensitivity. This is used **when a patient has allergic symptoms (runny nose, watery eyes, sneezing) and the direct cause is unknown**. Specifically used to investigate food, pet, aeroallergen (pollens, dust), venom (wasps, bees).
2. Allergy testing is contraindicated when there is a high risk of anaphylaxis based on past exposures or uncontrolled severe asthma.
3. Beta blockers such as propranolol should be stopped prior to testing for allergens for which there might be severe reactions during desensitization. If anaphylaxis occurs, we want to use epinephrine to reverse it, and beta blockers will make the epinephrine less effective.



RHEUMATOLOGY

C-ANCA (Antineutrophil Cytoplasmic Antibody)

- 1. What is this?**
- 2. How is it done?**
- 3. When do you answer C-ANCA?**
- 4. What is the most accurate diagnostic test?**

RHEUMATOLOGY

1. C-ANCA is the best initial test to make a specific diagnosis of Wegener's granulomatosis.
2. C-ANCA is a blood test. A pattern is seen on indirect immunofluorescence microscopy that indicates antibodies directed against proteinase 3 of neutrophils.
3. Answer C-ANCA when you see upper and lower respiratory problems combined with signs of renal disease such as hematuria and red cell casts in the urine. There will be hemoptysis, cough, and sputum with an abnormal chest X ray not responsive to antibiotics. Otitis and sinusitis will also be present.
4. The most accurate test for Wegener's granulomatosis is a biopsy of the lung or the kidney.



RHEUMATOLOGY

Anti-Scl 70 Antibodies

- 1. What is this?**
- 2. When do you answer anti-scl 70 antibodies?**
- 3. How would a negative test affect management?**
- 4. What is the patient at risk for if the anti-scl 70 is positive?**

RHEUMATOLOGY

1. Anti-scl 70 antibodies are directed against topoisomerase-1 and are ordered when **systemic sclerosis**, particularly the diffuse type, is suspected.
2. Look for polyarthralgia; Raynaud's phenomenon; thick, hide-bound skin; dysphagia; and GI tract hypomotility as well as pulmonary and renal abnormalities.
3. Anti-scl 70 antibodies have low sensitivity (30%). Hence, a negative test would not rule out the disease if clinical suspicion is high.
4. Anti-scl 70 is most strongly correlated with severe lung involvement such as pulmonary fibrosis.



RHEUMATOLOGY

Anti-Ro/Anti-La Antibodies

- 1. What diseases are they associated with?**
- 2. When are they the answer?**

A.

RHEUMATOLOGY

1. Anti-Ro and -La antibodies are associated with Sjögren's syndrome. Sjögren's syndrome presents with a positive ANA, anti-Ro/anti-La antibodies, and a positive rheumatoid factor.
2. Answer anti-Ro and -La when you see the triad of keratoconjunctivitis (sicca syndrome), xerostomia, and arthritis, or dry eyes, dry mouth, and arthritis.



RHEUMATOLOGY

Antihistone Antibodies

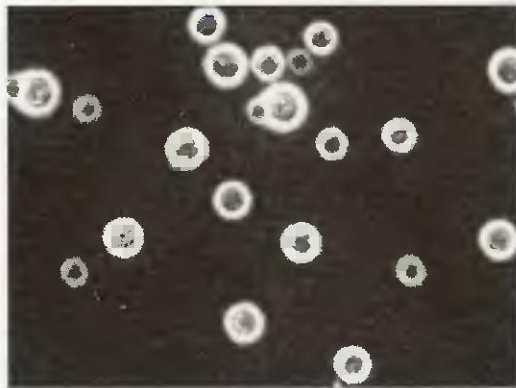
- 1. What are they specific for?**
- 2. What is the treatment?**

RHEUMATOLOGY

1. Antihistone antibodies are most often associated with drug-induced lupus (SLE). The most common drugs that cause lupus are procainamide, hydralazine, phenytoin, sulfonamides, isoniazid, and penicillamine.
2. There is no specific therapy. Stop the medication.

Q. INFECTIOUS DISEASES

1. What is this?
2. When is this the answer?
3. What is the most accurate diagnostic test?



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INFECTIOUS DISEASES

1. This is an India ink stain of the cerebrospinal fluid showing *Cryptococcus neoformans*. The organism has a mucopolysaccharide capsule that provides a “halo” around it that pushes away the India ink.
2. Answer India ink as the best initial test for cryptococcus, when you see a patient with AIDS with <100 CD4 cells who presents with fever, headache, and possibly a stiff neck. CSF will show a mild elevation of lymphocytes. The presentation is “subacute,” which means it is slower in onset and milder than bacterial meningitis. **Caution:** Normal CSF protein and white cell counts **do not** exclude cryptococcal meningitis.
3. The most accurate test for cryptococcal meningitis is either a cryptococcal antigen or fungal culture of the CSF.



INFECTIOUS DISEASES

Polymerase Chain Reaction HIV RNA Viral Load (PCR HIV RNA VL)

- 1. What is this?**
- 2. When this test is in the question, what should you think of?**
- 3. When do you answer PCR HIV RNA viral load?**

A.

INFECTIOUS DISEASES

- 1.** The PCR HIV viral load is a quantitative measurement of the amount of virus in circulation in the patient's blood.
- 2.** This test is the first thing to change in response to treatment. PCR HIV viral load is also the first thing to become abnormal if the patient stops taking medication or the treatment fails. The viral load test tells how fast the CD4 (T-helper) cells will drop. The higher the viral load, the faster the person's disease will progress. The lower the viral load, the slower the disease progresses.
- 3.** Measurements should be made at the time of the HIV diagnosis and every 3 to 4 months thereafter. The PCR viral load is also the basis of HIV sensitivity testing in order to determine the presence of resistance in a failing regimen.



INFECTIOUS DISEASES

VDRL/RPR

- 1. For which disease(s) is/are these tests used?**
- 2. What signs/symptoms would you expect the patient to have in this case?**
- 3. In what cases can you get false negative and false positive tests?**
- 4. Which test would you do if your clinical suspicion for the disease is high but the VDRL/RPR is negative?**
- 5. What is the response to treatment?**

A.

INFECTIOUS DISEASES

1. Serum measurement for these nontreponemal examinations are used for the diagnosis or screening of **syphilis**.
2. In the primary stage, you would expect the patient to present with a chancre and painless regional lymphadenopathy. In the secondary stage, rash, lymphadenopathy, condylomata lata, and alopecia can be expected. Tertiary syphilis is characterized by cardiac or neurological disease.
3. **False positives:** connective tissue diseases, infectious mononucleosis, malaria, leprosy, IV drug use, Hepatitis C, infective endocarditis, and pregnancy.
False negatives: prozone phenomenon—very high antibody titers are present.
4. When your clinical suspicion is high yet the nontreponemal tests are negative, you would want to do the darkfield examination in primary syphilis and the FTA-ABS test for the other stages.
5. The RPR and VDRL decrease or disappear in response to treatment. The FTA can remain positive lifelong.



INFECTIOUS DISEASES

Tzanck Smear

- 1. What is this?**
- 2. When is this the answer?**
- 3. What is the most accurate diagnostic test?**

A.

INFECTIOUS DISEASES

1. Tzanck preparation is used to diagnose the skin manifestations of either *Herpes simplex* or *Varicella zoster*. You are looking for multinucleated giant cells. Tzanck smear cannot distinguish between varicella (zoster) and herpes simplex.
2. Answer Tzanck smear as the best initial diagnostic test for skin or genital infections that might be herpetic in nature. Tzanck smear is **not** necessary if the diagnosis is clinically clear from the presence of vesicles.
3. The most accurate test for a herpetic infection of the skin or genitals is a viral culture.



INFECTIOUS DISEASES

Legionella Urine Antigen

- 1. What is this?**
- 2. What is the best test?**
- 3. When do I answer Legionella urine antigen?**

A.

INFECTIOUS DISEASES

1. Legionella urine antigen is the antigen found in Legionella pneumonia. It is the best initial test to make a specific diagnosis of Legionella.
2. Legionella urine antigen has a 100% specificity with *L. pneumophila* type 1. Only 70–80% of disease is caused by *L. pneumophila* type 1. Sputum culture or a culture of the tracheal aspirate on specialized charcoal/yeast extract remains the definitive test.
3. Answer Legionella antigen when you are shown a nursing home resident admitted for pneumonia that presents with fever, confusion, diarrhea, and hyponatremia. CPK, liver function tests, and creatinine can also be elevated.



INFECTIOUS DISEASES

Monospot Test

- 1. What is this?**
- 2. When do you answer monospot test?**
- 3. What is the most accurate test?**

A.

INFECTIOUS DISEASES

1. The monospot test is the initial test used to diagnose **infectious mononucleosis** (IM). It detects heterophile antibodies that are characteristic of Epstein-Barr virus (EBV).
2. Monospot test is the best initial test when the question shows a patient with sore throat, fever, lymphadenopathy, and malaise. A total of 50% of patients will have splenomegaly. Rash is present in 15% unless they have been given ampicillin, when it is present in closer to 90% of patients. Exudative pharyngitis may occur.
3. The most accurate test acutely is the IgM to EBV viral capsid antigen (VCA). Antibodies to EBV nuclear antigen (EBNA) rise in 3–4 weeks.



INFECTIOUS DISEASES

Indium-Labeled Leukocyte Scan

- 1.** How does this test work?
- 2.** When is an indium scan the right answer?
- 3.** What is the most accurate test?

A.

INFECTIOUS DISEASES

- 1.** Indium is a nuclear medicine test of occult infection or FUO. A sample of the patient's blood is drawn and incubated with indium. The indium-tags the white cells. The blood is re-injected into the patient. The indium-tagged white cells then localize to the site of infection.
- 2.** Look for a case of occult infection not found on routine testing such as blood cultures, chest X ray, or urinalysis. Indium is also useful when gallium is inaccurate, such as with intra-abdominal infections.
- 3.** A biopsy is more accurate than an indium scan.



INFECTIOUS DISEASES

KOH (Potassium Hydroxide) Prep

- 1. What is this test?**
- 2. When do you answer KOH?**
- 3. In which infection is the test associated with an amine odor?**

A.

INFECTIOUS DISEASES

1. KOH is the best initial test to diagnose superficial fungal infections. KOH is applied to a wet mount sample of vaginal discharge/secretions or to a skin scraping to identify fungi. This is seen under a microscope. Epithelial cells dissolve and the fungal structures remain behind and are visible.
2. KOH prep is indicated for the following:
 - *Tinea (pedis, manus, corporis, cruris, capitis)*
 - Onychomycosis
 - *Tinea versicolor*
 - *Candidiasis*
3. Applying KOH to a wet mount and smelling/whiffing immediately after yields a fishy (amine) in **bacterial vaginosis**.



INFECTIOUS DISEASES

Herpes Simplex PCR

1. What is this?
2. When is this the answer?

A.

INFECTIOUS DISEASES

1. Herpes simplex PCR is done on cerebrospinal fluid and is the single most accurate test for herpes encephalitis.
2. Look for a patient with fever, headache, and confusion of less than 2 weeks' duration. The PCR of CSF is more accurate than an EEG, head CT, MRI, or even brain biopsy.



INFECTIOUS DISEASES

Gallium Scanning

- 1. How does this test work?**
- 2. When is gallium scan the answer?**
- 3. What is the most accurate test to confirm an abnormal result?**

A.

INFECTIOUS DISEASES

1. Gallium is a nuclear scan that detects infection and some cancers. Gallium builds up in areas where white blood cells are present and there is increased iron metabolism. Gallium is transported on transferrin. Gallium is a nonspecific test that can help localize the site for subsequent CT or MRI scanning.
2. Answer gallium scan when you see a patient with persistent fever without localizing symptoms and the initial blood cultures, chest X ray, and urinalysis are negative. Gallium detects the source of fevers of unknown origin, lymphoma, and abscesses.
3. Ultimately, a **biopsy** is the most accurate way to determine the etiology of an abnormal gallium scan. Cancers require **histology** and infections require that the **culture** be confirmed.



INFECTIOUS DISEASES

Darkfield Microscopy

- 1. What is this?**
- 2. How is it done?**
- 3. When do you answer darkfield microscopy?**

A.

INFECTIOUS DISEASES

1. The darkfield is the most accurate test of primary syphilis.
2. A scraping of swab from the syphilitic chancre is rubbed on a slide.
3. Answer darkfield microscopy for primary syphilis when the question asks for the most accurate diagnostic test. In primary syphilis, there is a false negative rate of about 25% for the RPR or VDRL. The darkfield is more sensitive than an RPR.



INFECTIOUS DISEASES

CD4 (T-Cell) Counts

- 1. What is this?**
- 2. When is this the right answer?**
- 3. What prophylactic medications should be started based on this test?**

A.

INFECTIOUS DISEASES

1. CD4 count is used to monitor HIV-positive patients. Serum measurement of CD4 (T-cell) markers is representative of the number of helper T lymphocytes in the blood count. CD4 is used to determine the need for prophylactic antibiotics and to monitor the response to treatment. Start antiretroviral therapy: **CD4 <350 or viral load >55,000.**
2. Answer CD4 count as the best test to determine the severity of immunosuppression in **HIV/AIDS.**
3. Prophylaxis should be initiated in the following scenarios:
 - CD4 counts less than 200 cells/ul: TMP/SMX for *Pneumocystis jiroveci*
 - CD4 counts less than 100 cells/ul: TMP/SMZ for *Toxoplasma*
 - CD4 counts less than 100 cells/ul: itraconazole for **Histoplasmosis in endemic areas**
 - CD4 counts less than 50 cells/ul: azithromycin for *Mycobacterium avium* complex (MAC)



INFECTIOUS DISEASES

Bone Scan or Technetium Pyrophosphate Nuclear Bone Scan

- 1. What is this?**
- 2. How does it work?**
- 3. What makes it abnormal?**
- 4. What is the most accurate test?**

A.

INFECTIOUS DISEASES

- 1.** Bone scan is a method of detecting occult disease that has deposited in bone.
- 2.** Technetium is picked up by osteoblasts and deposited in the bone as they lay down new matrix. You must have osteoblastic activity in order for it to light up.
- 3.** Bone scans can be abnormal from both infections and malignancies. Osteomyelitis and cancer are detected by bone scans. Bone scans lack specificity and often cannot distinguish soft-tissue infection nearby from involvement of the bone.
- 4.** The precise etiology of the abnormality on a bone scan often requires a bone biopsy to confirm the diagnosis.



INFECTIOUS DISEASES

Bone Biopsy

- 1. When do you answer bone biopsy?**
- 2. For which disease(s) is this the gold-standard diagnostic test?**
- 3. What tests can replace this biopsy if osteomyelitis is suspected?**

A.

INFECTIOUS DISEASES

1. Look for a patient with diabetes and peripheral vascular disease with leg pain, warmth, and an ulcer who has an abnormality on X ray or MRI consistent with osteomyelitis.
2. A needle aspirate sample examined under a microscope is the gold-standard diagnostic test for the following diseases:
 - Osteomyelitis
 - Bone tumors
 - Metastatic osseous disease
3. Radiographic evidence of osteomyelitis and positive blood cultures can replace the bone biopsy if osteomyelitis is suspected.



INFECTIOUS DISEASES

Case: A 19-year-old sexually active female presents complaining of a yellowish-green discharge and dyspareunia. The wet mount of her discharge is shown.

- 1. What is her diagnosis?**
- 2. What is the treatment?**
- 3. What would be seen on pelvic exam?**
- 4. What is different about the organism on wet mount from every other cause of STD?**



Images used courtesy of www.dpd.cdc.gov.

A.

INFECTIOUS DISEASES

1. *Trichomonas* vaginitis
2. *Trichomonas* vaginitis is treated with oral Metronidazole with concurrent treatment of the sexual partner. Single-dose therapy is preferred because of increased patient adherence.
3. The pelvic examination will show a “strawberry cervix,” which is caused by multiple punctate hemorrhages visible on the cervix.
4. *Trichomonas* vaginalis is the only organism to be mobile on the wet mount as the flagella has it swim across the slide.

INFECTIOUS DISEASES

1. What is this test?
2. What disease are they associated with?
3. When do you answer this test?
4. What is the most common organism causing this disease?
5. Why is it important to treat this disease in pregnant women?



Image used courtesy of www.wrongdiagnosis.com (Adviware Pty Ltd).

A.

INFECTIOUS DISEASES

1. The smear is a wet mount and it shows clue cells. Clue cells are abnormal epithelial cells with ground-glass appearance and a hazy border. The tiny dark dots are bacteria stuck to the surface of the epithelial cells.
2. Bacterial vaginosis (BV)
3. Answer wet mount and clue cells when you see a woman with a thin, grayish/white vaginal discharge or vaginal itching. She may also describe dyspareunia. She may also describe a strong fishy odor (positive “whiff” test) adding KOH to slide. The pH in BV is usually >4.5 .
4. *Gardnerella vaginalis*
5. Pregnant women with BV are at increased risk for miscarriage, early (preterm) delivery, and infection after the pregnancy.

NEUROLOGY

1. What is the test?
2. What do these images show?
3. When is this test the right answer?
4. What the most accurate test?



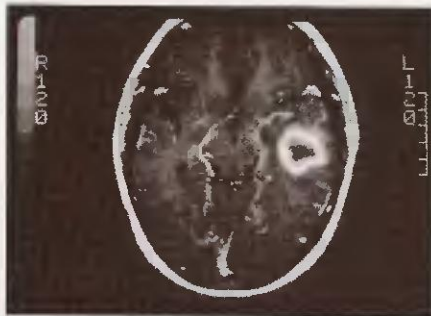
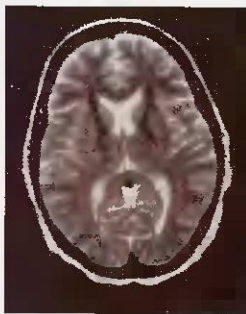
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NEUROLOGY

1. These are CT scans of the head without contrast.
2. They show intracranial hemorrhage. The image on the left shows an epidural hematoma. The image on the right shows a subdural hematoma. The epidural is from an arterial bleed and has higher pressure that more readily “pushes in” the brain, and the blood forms the shape of a lens. The subdural is from a venous bleed that forms the shape of a crescent.
3. The CT scan is always the best initial test for imaging the brain. This is especially true in trauma when looking for blood. The head CT is also the best initial test for a stroke, in which we are also looking for blood.
4. In head trauma, and intracranial bleeding such as subdural and epidural hematomas, there is no test more accurate than the head CT scan.

NEUROLOGY

1. What is the test?
2. What do these images show?
3. When is this test the right answer?
4. What the most accurate test?



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NEUROLOGY

1. This is an MRI of the brain.
2. The image on the left is normal. The image on the right shows a “ring” or contrast-enhancing lesion consistent with either cancer or infection.
3. The MRI is the most accurate test for strokes, multiple sclerosis, and most lesions of the brain stem and cerebellum.
4. The only test more accurate than an MRI for a mass lesion is a brain biopsy. If biopsy is not one of the choices and the question asks about the “most accurate test,” then the answer is MRI.



NEUROLOGY

Anti-Acetylcholine Receptor (Anti-Ach-R) Antibodies

- 1. What are these?**
- 2. When do you answer anti-acetylcholine receptor antibodies?**
- 3. What is more accurate than anti-Ach-R antibodies?**

NEUROLOGY

- 1.** Myasthenia gravis is characterized by anti-acetylcholine receptor antibodies (anti-Ach-R) that are made when autoimmune disease causes antibodies that bind to postsynaptic acetylcholine receptors: You can't have neuromuscular transmission if there is no receptor on the muscle because it has been eaten by an antibody.
- 2.** Anti-Ach-R antibodies are the best initial test for the diagnosis of myasthenia gravis. They are more accurate than tensilon or edrophonium testing.
- 3.** Single-fiber electromyography (EMG) is the most sensitive diagnostic test for myasthenia gravis.



NEUROLOGY

Carotid Doppler

- 1. What is this?**
- 2. When is the answer carotid doppler?**
- 3. What is the most accurate diagnostic test?**

NEUROLOGY

- 1.** Carotid doppler is a sonographic evaluation of the carotid arteries that allows a precise quantification of the degree of stenosis of these vessels. It is used to see whether the patient needs a carotid endarterectomy or angioplasty.
- 2.** Answer carotid doppler when you are presented with a patient with signs or symptoms of ischemia in the anterior circulation of the brain, such as amaurosis fugax or focal extremity weakness. It is the initial test to determine the etiology of embolic strokes or TIAs.
- 3.** The most accurate test of the carotid arteries is the angiogram.



NEUROLOGY

Cervical Spine X Ray

1. When is this test the answer?

NEUROLOGY

1. Look for a case of someone diving or falling and landing on his head, or having something really heavy land on his head. This gives increased axial loading.



NEUROLOGY

CT Myelogram

- 1. What is this test for?**
- 2. How is it done?**
- 3. When do you answer CT myelogram?**

NEUROLOGY

1. The CT myelogram is to detect compression of the spinal cord from mass lesions, such as cancer, and occasionally from a hematoma or an infection, such as an epidural abscess.
2. A spinal needle is introduced into the subarachnoid space. The patient is hung nearly upside-down in order to allow the contrast material inserted into the subarachnoid space to move and detect the lesion at the place it stops flowing. The MRI has essentially replaced the CT myelogram. The CT myelogram may have an advantage in detecting leptomeningeal cancer.
3. A CT myelogram is virtually never done. It is most often a **wrong** answer on your test. The MRI is the answer if you strongly suspect cord compression. The only reason to answer CT myelogram is if the MRI is not possible to do because the patient cannot lie still or has a metal pacemaker and the magnet of the MRI would be dangerous to the patient.



NEUROLOGY

Edrophonium (Tensilon) Test

- 1. What is this?**
- 2. When is it the answer?**
- 3. What is the most accurate test?**
- 4. What neoplasm is associated with this diagnosis?**

NEUROLOGY

- 1.** The edrophonium (Tensilon) test is a very sensitive test for the diagnosis of myasthenia gravis (MG). Edrophonium chloride is an acetylcholinesterase inhibitor with rapid onset and short duration of action. It prolongs the presence of acetylcholine in the neuromuscular junction and results in an immediate increase in muscle strength in affected muscles.
- 2.** Answer edrophonium testing when you see a case with muscular weakness that is worse with repetitive exercise. MG often starts with dysphagia, ocular weakness, or difficulty chewing because of masseter muscle weakness.
- 3.** Electromyography is the single most accurate test to confirm the diagnosis of MG.
- 4.** Thymomas are associated with the diagnosis of MG 10% of the time.



NEUROLOGY

Electroencephalogram (EEG)

- 1. What is this?**
- 2. When is this the best answer?**
- 3. What is the most sensitive form of this test?**

NEUROLOGY

1. An electroencephalogram (EEG) is the measurement of brain wave patterns by putting electrodes into the scalp.
2. Answer EEG when the patient has the new onset of possible seizure activity. Also, EEG is useful in patients with recurrent sudden-onset syncope if there is no cardiac etiology identified. EEG may be contributory in diagnosing Creutzfeldt-Jakob disease, but it is not as good as a brain biopsy. EEG is **not** necessary to determine brain death if the brain stem reflexes are clearly absent.
3. Sleep deprivation EEG has the greatest sensitivity. This is the answer if the patient has been seizure-free for 2 years and you want a test to see if it is safe to stop the anti-epileptic therapy.



NEUROLOGY

Electromyography (EMG)

- 1. What is this?**
- 2. How is it performed?**
- 3. When you see EMG in the case, what diseases should you think of?**
- 4. When is EMG the most accurate diagnostic test?**

NEUROLOGY

1. Electromyography (EMG) is a test of muscular strength and electrical activity. EMGs are used to diagnose primary neuromuscular diseases. EMG is used to distinguish between neural and muscular disorders.
2. A needle is placed into the muscle. The electrical activity during rest and activity is compared. An abnormal pattern or amplitude of electrical activity tells that there is disease.
3. An EMG in the case should make you think of myasthenia gravis, Guillain-Barre syndrome, and muscular dystrophy.
4. Single-fiber EMG is the single most accurate test for myasthenia gravis. Combined EMG and nerve conduction velocity testing is the single most accurate test for Guillain-Barré syndrome. EMG combined with muscle biopsy are the most accurate tests for polymyositis.





NEUROLOGY

Lumbar Puncture (LP)

- 1. What is this?**
- 2. When do I answer lumbar puncture?**
- 3. When is this procedure contraindicated?**

NEUROLOGY

- 1.** Lumbar puncture (LP) is the insertion of a spinal needle into the subarachnoid space to aspirate CSF fluid.
- 2.** LP is the answer in the following scenarios:
 - Patients with suspected meningeal infection
 - Patient with the worst headache of her life, in whom the CT scan is negative to exclude subarachnoid hemorrhage
 - New-onset seizures with fever
 - Any infant (less than 6 weeks old) with fever if the other studies are negative
- 3.** LPs are contraindicated with any suspected mass lesion. Do a head CT scan before the LP when there are focal findings, papill-edema, or a new seizure, or when the patient is so confused as to make the neurological examination inaccurate.



NEUROLOGY

Oligoclonal Bands

- 1. What is this?**
- 2. When do you answer oligoclonal bands?**
- 3. What is the most accurate test to diagnose the condition?**

NEUROLOGY

1. Detection of elevated bands of IgG (oligoclonal bands) in the CSF is possible in a patient presenting with signs and symptoms of **multiple sclerosis**. The presence of these bands is not specific.
2. Look for a young patient with weakness, numbness, unsteady gait, spastic paraparesis, diplopia, or sphincter disturbances (urinary urgency). Examining the CSF for oligoclonal bands is recommended only when the MRI is nonconfirmatory but your clinical suspicion for MS remains high.
3. MRI of the brain is the most accurate test to diagnose MS, with a sensitivity of 90–95%.



GASTROENTEROLOGY

Urea Breath Test

- 1. What is this?**
- 2. When is it used?**
- 3. When do you answer urea breath test?**

A.

GASTROENTEROLOGY

1. Urea breath testing is the measurement of radiolabeled carbon dioxide after the oral ingestion of labeled urea. *H. pylori* splits urea with urease. The labeled carbon is in the urea and is released as labeled carbon dioxide.
2. Urea breath testing is best used to confirm the eradication of *H. pylori* immediately after treatment. Serology does not rapidly improve after treatment. If an ulcer is found at endoscopy, the test of choice will be biopsy, not the urea breath test.
3. Answer urea breath test with a patient with epigastric pain that does not improve or that recurs after a proton pump inhibitor and antibiotics have been given. There is no routine test of cure for *H. pylori*. You do not do the test if the patient feels better after treatment.



GASTROENTEROLOGY

Serum Trypsinogen Concentration

- 1. What is this test for?**
- 2. When is it the answer?**

GASTROENTEROLOGY

1. Serum assay of trypsinogen is used when you suspect **chronic pancreatitis** in a patient with steatorrhea. This is the only test that is specific for steatorrhea of pancreatic origin. Trypsinogen levels are low if the fat malabsorption is from a burned-out pancreas.
2. Answer trypsinogen level only after Sudan black stain has confirmed a fat malabsorption. Antigliadin and anti-endomysial antibodies should be normal. Low trypsinogen levels are specific but not sensitive for chronic pancreatitis.



GASTROENTEROLOGY

Fasting Transferrin Saturation

- 1. What is this?**
- 2. When do you answer fasting transferrin saturation?**
- 3. How would you confirm an abnormal test?**
- 4. What is the pathogenesis?**
- 5. When is the optimal timing of screening?**

A.

GASTROENTEROLOGY

1. Serum measurement of fasting transferrin saturation is the best initial test to diagnose **hereditary hemochromatosis (HH)** as well as the screening test for asymptomatic family members. Fasting transferrin saturation = (serum iron/TIBC).
2. Answer fasting transferrin saturation when you see a case of liver disease with joint pain, diabetes, cardiomyopathy, skin hyperpigmentation, and infertility.
3. Liver biopsy is the most accurate test.
4. The pathogenesis is genetically determined abnormal increase in intestinal absorption of iron.
5. The optimal timing for screening family members is between the ages of 18 and 30, before organ damage (e.g., cirrhosis) has occurred.



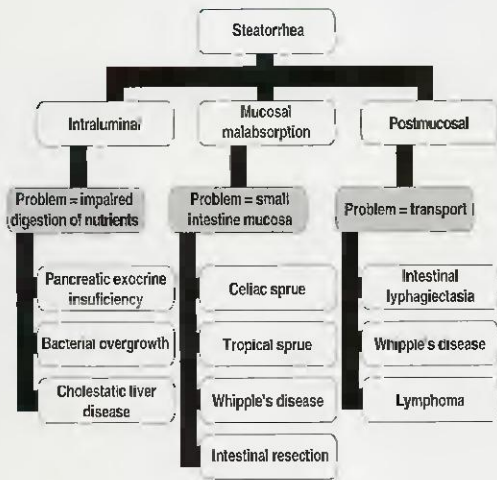
GASTROENTEROLOGY

Sudan Black Stain

- 1. What is this?**
- 2. What is the most accurate test?**
- 3. When do I answer Sudan black stain?**

GASTROENTEROLOGY

1. Stool staining with Sudan black is used to detect steatorrhea as a sign of fat malabsorption.
2. Seventy-two-hour quantitative estimation of stool fat is the most accurate test because of increased sensitivity. The 72-hour estimation is **almost always the wrong answer**.
3. Answer Sudan black stain when you see a patient with chronic pale, greasy, malodorous diarrhea, and no evidence of infection.





GASTROENTEROLOGY

String Test

- 1. What is this?**
- 2. When is it the answer?**

A.

GASTROENTEROLOGY

1. The string test is an old test for giardiasis. The string test samples the duodenal mucosa without the need of endoscopy. A string is swallowed and left in place with one end in the duodenum and the other end hanging out through the patient's mouth.
2. String testing is **always** the **wrong** answer. Stool ova and parasite testing is sufficiently sensitive and less invasive. Stool Giardia antigen testing by ELISA is the single most accurate test for Giardia and is considerably less invasive.



GASTROENTEROLOGY

72-Hour Fecal Fat

- 1. What is this test for?**
- 2. When do you answer 72-hour fecal fat test?**

GASTROENTEROLOGY

1. The 72-hour fecal fat collection is an old test for intestinal malabsorption. As the name implies, you are supposed to collect 3 days' worth of stool in order to have a very sensitive test for fat malabsorption. A single test of a Sudan black stain of the stool for the presence of fat is usually sufficient.
2. The 72-hour fecal fat collection is the single most accurate test for fat malabsorption; **however**, it is virtually never done and is most often a **wrong** answer on your test. The 72-hour fecal fat is the answer if you strongly suspect fat malabsorption and the Sudan black stain is negative.



GASTROENTEROLOGY

Screening Upper Endoscopy

Case: A 52-year-old man is in your office for routine evaluation. He has had esophageal reflux disease for the last 7 years that is generally well controlled.

1. Who should upper endoscopy screening be offered to?
2. What is the treatment for an abnormal endoscopy?

GASTROENTEROLOGY

1. Screening upper endoscopy should be performed in patients with gastroesophageal reflux disease (GERD) in whom the symptoms have been present for more than 5 years. You are screening to see if there is Barrett's esophagus, which is when the lower esophagus is transforming from squamous to columnar epithelium. Screening for the presence of esophageal varices should be done in those with cirrhosis.
2. Barrett's esophagus is treated with proton pump inhibitors (PPIs) with a repeat upper endoscopy every 2–3 years. Low-grade esophageal dysplasia is treated with PPIs with a repeat upper endoscopy in 6 months. Those with varices should receive propranolol to decrease the risk of bleeding.



GASTROENTEROLOGY

Secretin Stimulation Test

- 1. For what diseases do you answer secretin stimulation testing?**
- 2. What is it?**
- 3. When do you answer secretin stimulation test?**

GASTROENTEROLOGY

1. Secretin stimulation is a rarely used test for two completely separate diseases: Zollinger-Ellison syndrome (ZES) and chronic pancreatitis.
2. **ZES:** You inject secretin intravenously and measure the level of gastrin in blood. Secretin should inhibit gastrin and lower the levels of gastrin in a normal person. In ZES there is a failure to suppress gastrin levels.
Chronic pancreatitis: Normally, secretin should induce a large release of bicarbonate from the pancreas into the duodenum. During the test, you place a nasogastric tube in the duodenum and measure the release of bicarbonate from the sphincter of Oddi. With chronic pancreatitis, the pancreas is too burned out and tired to do anything.
3. Answer secretin stimulation testing in ZES when the patient has large, recurrent, and multiple ulcers, but has a nondiagnostic fasting serum gastrin concentration. For chronic pancreatitis, look for a patient with fat malabsorption with no evidence of celiac disease and a normal D-xylose test.



GASTROENTEROLOGY

24-Hour pH Monitoring

- 1. What is this test for?**
- 2. When do you answer 24-hour pH monitoring?**

A.

GASTROENTEROLOGY

1. Twenty-four-hour esophageal pH recording is indicated to document abnormal esophageal acid exposure.
2. It is the appropriate test in the following scenarios:
 - Persistent symptoms of gastroesophageal reflux disease (GERD) after at least 4 weeks of treatment with proton pump inhibitors (PPIs)
 - To exclude GERD in a patient with unexplained chest pain
 - GERD symptoms with a negative upper endoscopy when you are considering antireflux surgical repair
 - To assess the efficacy of antireflux surgery
 - To evaluate patients with laryngitis, pharyngitis, chronic cough, nonallergic asthma (reflux-induced asthma)



GASTROENTEROLOGY

PAS Staining

- 1. What is this test for?**
- 2. When do you answer PAS staining?**
- 3. How do you treat?**

A.

GASTROENTEROLOGY

1. PAS staining on a small bowel biopsy specimen is the most accurate test for **Whipple's disease**.
2. Look for chronic multisystem illness, initially rheumatological (80%), then with fat malabsorption (75%), fever (50%), and ocular and neurological complaints.
3. Initial course of Ceftriaxone followed by trimethoprim-sulfamethoxazole for 1 year.



GASTROENTEROLOGY

HIDA Scanning

- 1. What is this test for?**
- 2. When do you answer HIDA scan?**
- 3. How does it work?**
- 4. When is the HIDA scan the most common wrong answer?**

A.

GASTROENTEROLOGY

1. HIDA scan is used when you suspect **acute cholecystitis with a nondiagnostic ultrasonography**.
2. Answer HIDA scan when you see either:
 - a. Gallstones without gallbladder edema and ultrasound Murphy's sign, or
 - b. Gallbladder edema and ultrasound Murphy's sign without gallstones.
3. HIDA is taken up by hepatocytes and excreted into bile and concentrated in the gallbladder. If the gallbladder does **not** opacify, it means that there is an obstruction of the cystic duct. Leakage into the pericholecystic space suggests perforation. On a normal scan the gallbladder should opacify.
4. The HIDA is not recommended in critically ill patients who should be taken to the operating room. If the diagnosis is obvious, the HIDA scan is not necessary, surgery is necessary.



GASTROENTEROLOGY

- ***HFE Gene***
- ***C282Y Mutation***

1. What are these?
2. When do you answer this?

A.

GASTROENTEROLOGY

1. The HFE gene and C282Y mutation both lead to the overabsorption of iron in the duodenum. They are the confirmatory tests for hemochromatosis. These genetic tests and an MRI can eliminate the need for liver biopsy to diagnose hemochromatosis.
2. Answer HFE gene and C282Y mutation when you are shown a patient with the characteristics of hemochromatosis and abnormal iron studies consistent with hemochromatosis. The patient will have liver disease, skin hyperpigmentation, joint pain, diabetes, and infertility. The iron and ferritin levels will be elevated and the iron-binding capacity will be markedly diminished.



GASTROENTEROLOGY

Gastrograffin

- 1. What is this?**
- 2. When do you answer gastrograffin?**
- 3. What is the most accurate test?**

GASTROENTEROLOGY

1. Serum gastrin levels should be measured when you suspect **Zollinger-Ellison syndrome (ZES)**.
2. Look for ulcers that are large (>1 cm), recurrent, distal, and multiple. A gastrin level greater than 1,000 pg/ml is diagnostic. **Remember:** Everyone on a PPI has a high gastrin level.
3. The secretin stimulation test can confirm ZES when serum gastrin concentration testing is nondiagnostic. In ZES, gastrin levels do not go down with secretin.
4. ZES is associated with MEN I:
 - Hyperparathyroidism
 - Pituitary adenomas
 - Pancreatic islet cell/gastrointestinal adenomas



GASTROENTEROLOGY

Gastrin Level

- 1. What is this?**
- 2. When do you answer gastrin level as the best initial test?**
- 3. What additional test would you like if this is not diagnostic?**
- 4. What disease is the syndrome part of?**

A.

GASTROENTEROLOGY

1. Gastrograffin is a water-soluble form of radio-opaque contrast material that is used when there is the possibility that there has been organ perforation and the material may leak through into the peritoneum. Gastrograffin is used as the diagnostic test of choice for **Boerhaave's syndrome**, or esophageal perforation, because barium going through a perforation causes inflammation.
2. Look for a patient presenting with a recent history of severe retching followed by severe chest pain, dyspnea, shock, and possible crepitation. Initial chest X ray would show free air in the mediastinum or peritoneum.
3. The most accurate test is a CT scan.



GASTROENTEROLOGY

Fecal Leukocytes

- 1. What is this test for?**
- 2. What diseases is it associated with?**
- 3. When do you answer fecal leukocytes?**

GASTROENTEROLOGY

1. Fecal leukocytes are used to assess the etiology of acute diarrhea.
2. Invasive and inflammatory causes of diarrhea can give both blood as well as fecal leukocytes. Diseases such as *Salmonella*, *Shigella*, *Campylobacter*, etc., can give both blood as well as white cells in the stool.
3. Look for a patient with diarrhea with no blood in whom you are trying to see if there is an invasive form of diarrhea. Fecal leukocytes are not found with diarrhea secondary to viruses, most protozoans, or pre-formed toxins such as *Bacillus cereus* or staph.



GASTROENTEROLOGY

Fecal Occult Blood Testing

- 1. What is this?**
- 2. When is this the right answer?**
- 3. What do you do for a positive test?**

GASTROENTEROLOGY

- 1.** Fecal occult blood testing (FOBT) is the screening of normal brown stool for microscopic amounts of blood not grossly visible. Gross blood or dark stool, such as melena, does not occur until >100 ml of blood has been lost in the bowel. The FOBT will detect as little as 5–10 ml of blood.
- 2.** FOBT is a screening test for occult blood in the stool. FOBT is an option for screening for colon cancer in those above the age of 50. In colon cancer screening the three methods of screening, are: colonoscopy every 10 years, sigmoidoscopy every 3–5 years, FOBT every year after age 50.
- 3.** A positive FOBT should be investigated with a colonoscopy.



GASTROENTEROLOGY

Esophageal Manometry

1. What is this test for?
2. How is it done?
3. When do you answer esophageal manometry?

A.

GASTROENTEROLOGY

1. Esophageal manometry is used to establish the diagnosis of dysphagia or unexplained chest pain when there is no mechanical obstruction.
2. Esophageal manometry consists of a transducer placed in the esophagus to record pressure.
3. Look for a case of dysphagia with an inconclusive barium radiograph or upper endoscopy. If the stem of the question clearly describes a motility problem, you do not have to do either endoscopy or barium prior to doing the manometry; for example, achalasia, diffuse esophageal spasm, or nutcracker esophagus.



GASTROENTEROLOGY

Endoscopic Retrograde Cholangiopancreatography (ERCP)

- 1. What is this?**
- 2. For which condition is this the most accurate test?**
- 3. What are the characteristic lesions?**
- 4. When do I answer ERCP?**

GASTROENTEROLOGY

1. ERCP is a direct visualization of the biliary tract.
2. ERCP is the most accurate diagnostic test for stones in the biliary system. ERCP is also the most accurate test for **primary sclerosing cholangitis (PSC)**.
3. In sclerosing cholangitis there are multiple intrahepatic and/or extrahepatic strictures of the biliary tract on cholangiography. This gives the biliary radicles a “beaded” appearance.
4. The strongest indication for ERCP is when the patient has high fever, chills, right upper-quadrant abdominal pain, and jaundice. ERCP is both diagnostic and therapeutic because you can remove the stone. For PSC, look for a patient with a history of ulcerative colitis complaining of pruritus and jaundice with a negative hepatitis profile and negative abdominal sonogram.



GASTROENTEROLOGY

D-Xylose Test

- 1. What is this?**
- 2. When do you answer D-xylose testing?**
- 3. What is the most accurate test?**
- 4. What diseases will make it abnormal?**

GASTROENTEROLOGY

1. D-xylose testing is used in determining the etiology of different **malabsorption syndromes**. D-xylose is used to **differentiate between intestinal malabsorption and chronic pancreatitis**. Celiac disease is the most common cause of intestinal malabsorption. D-xylose is a sugar that should be absorbed if the small bowel mucosa is intact. It does not require digestive pancreatic enzymes. A low D-xylose level in the urine indicates that the intestinal mucosa is defective and that D-xylose was not absorbed.
2. Look for a patient with foul-smelling stool without blood, who has weight loss, malnutrition, fat in stool, and a positive Sudan black stain.
3. The most accurate test of the small bowel mucosa is a biopsy to assess histology and architecture.
4. The D-xylose test is abnormal with celiac disease, tropical sprue, and Whipple's disease.



GASTROENTEROLOGY

Colonoscopy

1. When do we screen?
2. How do the screening recommendations change if the risk of colon cancer is higher?

GASTROENTEROLOGY

Colonoscopy is recommended as screening for colon cancer.

- General population:
 - Every 10 years for patients over age 50. Colonoscopy is superior to occult blood testing or sigmoidoscopy.
- Single family member with colon cancer:
 - Start at age 40 or 10 years earlier than the family member's diagnosis, whichever is earlier.
- Hereditary non-polyposis cancer syndrome (HNPCC or Lynch syndrome):
 - Three family members, two generations, one premature. Premature means the cancer was before age 50. Start at age 25 and repeat every 1–2 years.



GASTROENTEROLOGY

Ceruloplasmin

- 1. What is this?**
- 2. When do you answer ceruloplasmin?**
- 3. Is a high or low value abnormal?**
- 4. What additional tests would confirm the diagnosis?**

A.

GASTROENTEROLOGY

1. Serum ceruloplasmin levels and the presence of Kayser-Fleischer rings on exam are the best initial tests for **Wilson's disease**.
2. Look for a patient with the combination of unexplained hepatic and psychiatric abnormalities with a movement disorder.
3. An extremely low serum ceruloplasmin level should be taken as strong evidence for the diagnosis of Wilson's disease.
4. Twenty-four-hour urine copper excretion will be abnormally high. The most accurate test is the liver biopsy. Wilson's disease is a disease of copper overload. This is because of the inability of the liver to incorporate copper into the protein ceruloplasmin for excretion into the bile. This leads to hepatic copper accumulation and injury. This eventually spills into the bloodstream and deposits into the brain (behavior and movement changes), kidneys (renal insufficiency), and cornea (Kayser- Fleischer rings).



GASTROENTEROLOGY

Bleeding Scan

1. What is this?
2. When do you answer bleeding scan?

GASTROENTEROLOGY

1. The bleeding scan, or technetium-labeled RBC scanning, is performed in a patient with small amounts of active **lower GI bleeding** in which the bleeding site could not be identified with endoscopy. Bleeding scan is sensitive, but not specific. If the bleeding scan is positive, you cannot identify the precise etiology of the bleeding. Angiography is another diagnostic option for the patient with persistent, severe GI bleeding without an identified source.
2. Look for a patient who presents with severe gastrointestinal bleeding in whom the lower endoscopy is unable to find a source. The bleeding continues and the patient may still require transfusions.



GASTROENTEROLOGY

Bernstein Test

- 1. What is this?**
- 2. How is it done?**
- 3. When is a Bernstein test the right answer?**

GASTROENTEROLOGY

1. The Bernstein test is to diagnose gastroesophageal reflux disease.
2. The Bernstein test involves the placement of a nasogastric tube into the esophagus with the tip at the end of the esophagus near the gastroesophageal junction. Dilute hydrochloric acid is instilled or dripped into the esophagus in an attempt to reproduce the symptoms of reflux disease. This is an older test that has been made obsolete by the use of empiric trials of PPIs or the 24-hour pH monitor.
3. The Bernstein test is always wrong to do. When you see it in the answers as a diagnostic test, do not choose it.



GASTROENTEROLOGY

Barium Esophagram

- 1.** For which clinical condition is this the best initial test?
- 2.** For which conditions is this the most accurate test?
- 3.** What is the most accurate test for abnormalities detected?

GASTROENTEROLOGY

1. **Barium esophagram** is, generally, the best initial test for dysphagia. This is **not** in scenarios where there are clear signs of obstruction, for which upper endoscopy would be the best initial test. For **achalasia**, barium esophagram shows a “bird’s beak” at the gastroesophageal junction. In **diffuse esophageal spasm**, barium esophagram shows a “corkscrew” pattern at the time of spasm.
2. Barium esophagram is the most accurate test for esophageal rings, webs, and diverticuli.
3. In achalasia, esophageal spasm, and nutcracker esophagus, the most accurate test is manometry. With cancer, the most accurate test is endoscopy for a biopsy.



GASTROENTEROLOGY

Anti-Smooth Muscle Antibodies

- 1. What is this?**
- 2. When do you answer it?**
- 3. What other immune markers are associated with this disorder?**
- 4. What is the most accurate test?**

A.

GASTROENTEROLOGY

1. Serum assay detection of anti-smooth muscle antibodies (ASMA) is the best initial test for **autoimmune hepatitis**.
2. Answer ASMA when you are shown a young female with liver disease who does not drink or have inflammatory bowel disease or infectious hepatitis.
3. Autoimmune hepatitis is associated with antinuclear antibodies (ANA) and antibodies to liver/kidney microsome type 1 (anti-LKM1).
4. Liver biopsy is the most accurate test for autoimmune hepatitis and most other liver diseases.



GASTROENTEROLOGY

Antimitochondrial Antibodies (AMA)

- 1. What is this test for?**
- 2. When do you answer AMA?**
- 3. What is the most accurate test?**

A.

GASTROENTEROLOGY

1. Serum screening for antimitochondrial antibodies is the best initial test to make a specific diagnosis of primary biliary cirrhosis (PBC).
2. Look for a middle-aged female presenting with itching (pruritus) and an elevated alkaline phosphatase with a normal bilirubin.
3. The most accurate test for PBC is a liver biopsy.

Q.

GASTROENTEROLOGY

Capsule Endoscopy

1. What is it?
2. When do you answer capsule endoscopy?



Image used courtesy of www.clevelandclinic.org
(Digestive Disease Center).

KAPLAN
MEDICAL

A.

GASTROENTEROLOGY

1. It is a capsule the size of a large pill, with a camera and a small transmitter. Once swallowed, it begins transmitting images of the inside gastrointestinal tract to a receiver worn by the patient. The doctor can review 6 hours worth of pictures for any abnormalities.
2. Capsule endoscopy is the procedure of choice for suspected small bowel bleeding that was not detected with upper or lower endoscopy.



Image used courtesy of www.clevelandclinic.org
(Digestive Disease Center).



GASTROENTEROLOGY

- *Antiendomysial*
- *Antigliadin Antibodies*

1. What are these?
2. When are they the answer?
3. What is the most accurate test?

A.

GASTROENTEROLOGY

1. Serum assay for endomysial and antigliadin antibodies are made against wheat or gluten (gliadin) antigens and the villous (endomysial) lining of the small intestine. They are used to confirm the diagnosis of celiac disease.
2. Look for a case of probable celiac disease with oily, greasy diarrhea, foul-smelling stool without evidence of chronic pancreatitis. They are the tests to answer to confirm gluten-sensitive enteropathy after Sudan black stain has confirmed a fat malabsorption.
3. Small bowel biopsy is the most accurate test for celiac disease. It must be done to exclude lymphoma as well as to diagnose the disease.

GASTROENTEROLOGY

Barium Enema

- 1. For which diseases is this the right answer?**
- 2. What would be the best follow-up test?**
- 3. When is this a wrong answer?**
- 4. What do the images show?**
- 5. When do you answer barium enema?**



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GASTROENTEROLOGY

1. Barium enema (BE) creates a “contrast” picture to outline the lining of the rectum and colon. BE can be used in detecting **colorectal cancers, polyps, diverticulosis, and bowel obstruction** and to evaluate the extent of **inflammatory bowel disease**.
2. Barium enema is **inferior** to **colonoscopy** if you are suspecting a lesion in the colon. Colonoscopy is also superior to enema in that it can directly biopsy lesions or remove polyps.
3. Patient’s who may have **peritonitis** or **bowel perforation** must not undergo this test because the contrast material can leak into the peritoneum through the perforation. BE is also contraindicated in diverticulitis, in which it increases the risk of perforation.
4. The left image shows a colon cancer, and the right image shows diverticulosis.
5. BE is **never** the answer to the question, “What is the most accurate test?” if colonoscopy is one of the choices.



GASTROENTEROLOGY

1. What is this?
2. What is the pathophysiology behind this?
3. What are some of the complications?



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A.

GASTROENTEROLOGY

1. This is an upper endoscopy showing Barrett's esophagus.
2. Barrett's esophagus occurs when the distal stratified squamous mucosa is replaced by metaplastic columnar epithelium containing goblet cells. The metaplasia results as a form of defense from the persistent acid reflux that the cells get exposed to. Barrett's esophagus is not reversible but it is preventable with PPIs.
3. Complications of Barrett's esophagus are ulcers, strictures, and adenocarcinoma.

GASTROENTEROLOGY

1. What is the study?
2. What is the abnormality presented?
3. What is the most accurate test?
4. When is this study the answer?



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GASTROENTEROLOGY

1. This is an abdominal X ray.
2. The abnormality is a small bowel obstruction. There are multiple air-fluid levels seen throughout the bowel.
3. The most accurate test for small bowel obstruction is a combination of the abdominal X ray and the abdominal CT scan. There is no blood test to diagnose obstruction and there are no findings on endoscopy.
4. Suspected small bowel obstruction is the only use for the abdominal X ray. Look for a patient with abdominal pain and distension; hypoactive or absent bowel sounds, possible electrolyte abnormalities such as potassium; calcium, or magnesium disorders; and the failure to pass either stool or flatus. This is normal after abdominal surgery.



GASTROENTEROLOGY

Amylase/Lipase Levels

- 1. What is this?**
- 2. When do you answer amylase and lipase levels?**
- 3. What is the most accurate test?**

GASTROENTEROLOGY

1. Amylase and lipase are the initial tests in the diagnosis of **acute pancreatitis**. Lipase is more specific for the pancreas. Amylase can be elevated from damage to the salivary glands, esophagus, or small bowel.
2. Answer amylase/lipase for a patient presenting with the acute onset of severe epigastric pain radiating to the back. Such a patient may have a history of alcohol abuse or gallstones.
3. The most accurate test for acute pancreatitis is an abdominal CT scan. The abdominal CT scan is more accurate than Ranson's criteria. Pancreatic necrosis on a CT scan is extremely specific for severe pancreatitis and is the main indicator of the need for a pancreatic biopsy.



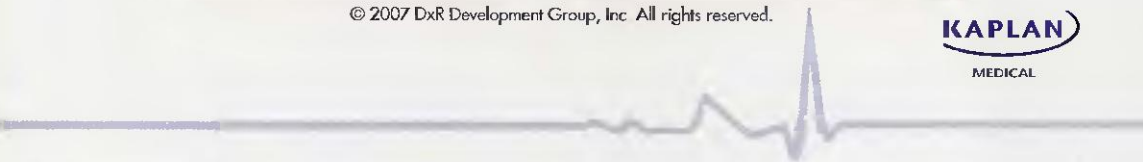
PULMONARY

- 1. What is the study and what is the abnormality seen?**
- 2. What is the most common etiology?**
- 3. What is the most accurate test?**



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KAPLAN
MEDICAL



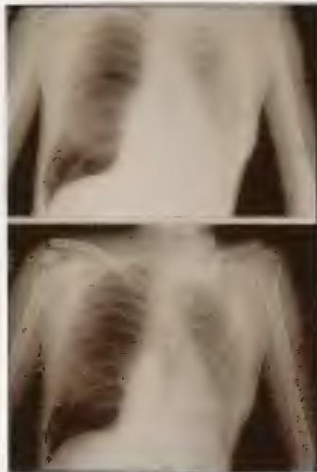
PULMONARY

1. This is a normal chest X ray on the left and a chest X ray showing a pleural effusion on the right.
2. The most common etiology of a pleural effusion is congestive heart failure or pneumonia. Any infection can cause an effusion, although bacterial infection is the most common. Less common causes are trauma, cancer, and connective tissue diseases such as lupus.
3. The most accurate test for a pleural effusion is a thoracentesis for fluid analysis. The MRI or CT is never the most accurate test for an infectious or neoplastic process. A high protein level indicates infection or cancer. A high cell count and/or low pH (<7.2) indicates an infection.

Q.

PULMONARY

1. What is the diagnosis?
2. What case presentation goes along with these images?
3. What is the next best step in management?



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KAPLAN
MEDICAL

PULMONARY

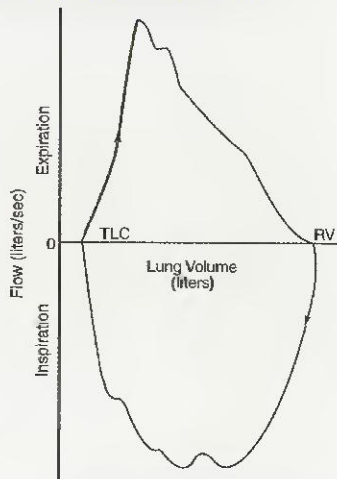
1. The chest X ray shows a pneumothorax.
2. In all three cases, the patient will present as acutely short of breath with decreased breath sounds on one side, hyperresonance to percussion, and tracheal deviation. It may be spontaneous, from a central venous catheter placed in the subclavian vein, or from ruptured bullae from pneumocystis or COPD.
3. The next step after a pneumothorax is detected is to re-inflate the lung. If there is a "tension" pneumothorax, then a needle decompression should be performed. All large pneumothoraces require the placement of a chest tube.



PULMONARY

Flow-Volume Loop

1. What is this?
2. When is this test the answer?



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A.

PULMONARY

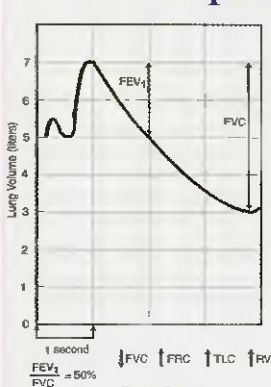
1. Flow-volume loops are a graphical representation of inhalation and exhalation. The inhalation starts at the far right and the tracing moves down. Exhalation begins at the far left and the tracing moves up as you exhale. The loop tells not only how much you inhale/exhale, but also how fast.
2. This test is to assess various forms of obstructive and restrictive lung disease; for example, to tell the difference between COPD and interstitial lung disease. The flow-volume loop has no use in assessing infections, mass lesions, or reactive airways disease. The flow volume loop is a graphical representation meant to uncover subtle defects in ventilation not easily represented on the numerical values of the other parts of the PFTs.



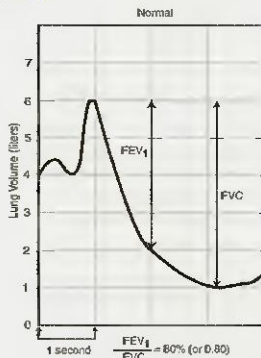
PULMONARY

Pulmonary Function Testing (PFT)

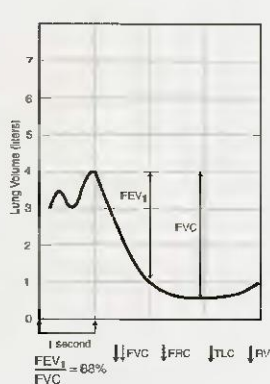
1. What are these?
2. What is shown in Graphs A and C?
3. When is a PFT the most accurate diagnostic test?
4. What is the single most accurate test on the PFT for each pattern?



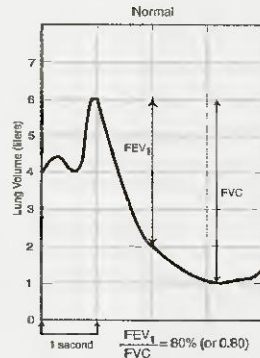
Graph A



Graph B



Graph C



Graph D

A.

PULMONARY

1. These are pulmonary function tests. The patient gives a maximum exhalation after a maximum inhalation. That is the FVC, or forced vital capacity. A normal person should be able to exhale at least 80% of the air in 1 second or FEV_1 .
2. Graph A shows obstructive disease. You see a decrease in both the FEV_1 and FVC; however, the FEV_1 decreases even more. This gives an abnormally low ratio of FEV_1 to FVC of $<80\%$. The residual volume goes up and that is why the patient gets a barrel chest and flat diaphragm. This is caused by COPD. Graph C shows restrictive lung disease. All the volumes are diminished, but they are diminished proportionately so all the ratios stay normal. Restrictive lung disease is caused by interstitial fibrosis.
3. The PFT is the most accurate test to distinguish obstructive from restrictive lung disease in a person who is short of breath. When combined with bronchodilators or methacholine, PFTs are the most accurate test to diagnose asthma or reactive airways disease.
4. The single most accurate part of the PFT is the FEV_1 /FVC ratio.

Q.

PULMONARY

Serum Alpha-1 Antitrypsin Level

1. When is this the answer?

A.

PULMONARY

1. Serum alpha-1 antitrypsin (AAT) level is measured in a young nonsmoker with emphysema and liver disease. It may also be measured in a patient with a strong family history of emphysema. Low levels indicate **AAT deficiency**, in which the body lacks an elastase inhibitor.



PULMONARY

Serum ACE Levels

- 1. What is this?**
- 2. When is the answer ACE levels?**
- 3. What is the most accurate diagnostic test?**

PULMONARY

- 1.** Increased ACE levels are associated with sarcoidosis in 75% of patients. ACE levels are contributory to establishing the diagnosis of sarcoidosis.
- 2.** Answer ACE levels when you are shown an African-American female patient who presents with cough, dyspnea, chest pain, and bilateral hilar adenopathy on chest X ray.
- 3.** The most accurate diagnostic test for sarcoidosis is the presence of noncaseating granulomas on biopsy.



PULMONARY

Arterial Blood Gases (ABG)

- 1. What do you see on this test?**
- 2. In what way is an ABG superior to a pulse oximeter?**
- 3. When do you answer ABG?**

A.

PULMONARY

1. The arterial blood gas (ABG) directly measures the pH, partial pressure of carbon dioxide ($p\text{CO}_2$), and the partial pressure of oxygen ($p\text{O}_2$). The bicarbonate level is determined based on a calculation from the pH and the $p\text{CO}_2$. This allows you to calculate the alveolar-arterial (A-a) gradient.
2. The saturation determined from an oximeter is within 1–2% of that obtained on an ABG, so we do **not** need to do an ABG for O_2 saturation. An ABG allows you to know how hard someone is working in order to become oxygenated and whether there is life-threatening acidosis.
3. Answer ABG if there is COPD or another possibility of respiratory acidosis. Answer ABG if the question shows a case with a low serum bicarbonate and there may be a severe metabolic acidosis.



PULMONARY

Purified Protein Derivative (PPD)

- 1. When is this test the answer?**
- 2. What is a positive test?**
- 3. Would you do any other tests to confirm your diagnosis?**
- 4. What is the impact of previous BCG vaccination?**

A.

PULMONARY

1. The PPD is to screen for exposure to tuberculosis (TB) and the possibility of latent infection. **PPD testing is only to screen asymptomatic patients.**
2. The test is positive based on the situation.
 1. **> or = 5 mm:** HIV-positive, recent contact with person with active TB, patient with changes on CXR suggestive of prior TB, patients with organ transplants or other immunosuppressed patients
 2. **> or = 10 mm:** recent immigrants from countries with high TB prevalence, injection drug users, residents/employees of hospitals, nursing homes, and homeless shelters, and patients with diabetes, renal failure, or hematological malignancies
 3. **> or = 15 mm:** persons with no risk factors for TB
3. All patients with a positive PPD should get a chest X ray to exclude active disease. Positive tests are treated with isoniazid for 9 months.
4. Previous vaccination with BCG has **no impact** on these recommendations. A test result >10 mm is **not** to be considered a false positive because of a previous BCG.



PULMONARY

Sweat Chloride Test

- 1. What is this?**
- 2. How is it done?**
- 3. When do you answer sweat chloride test?**

A.

PULMONARY

1. Sweat chloride test is the best test (the gold standard) for the diagnosis of cystic fibrosis.
2. Pilocarpine is given and the amount of sodium and chloride is measured in the sweat.
3. Answer sweat chloride test when you are shown a patient with chronic respiratory problems such as a cough, wheezing, and shortness of breath. There will also be signs of fat malabsorption such as bulky stools and vitamin A, D, E, and K deficiency in a patient who has been unable to have children. Look for an infant with failure to thrive. Blood gas will reveal hypoxemia.

PULMONARY

Bronchoscopy

- 1. What is this?**
- 2. When is bronchoscopy the most accurate diagnostic test?**
- 3. What is more accurate than a bronchoscopy?**



PULMONARY

- 1.** Bronchoscopy is the insertion of a small, thin fiberoptic scope through the nose, through the vocal cords, through the carina, and into a mid-sized branching bronchus.
- 2.** Bronchoscopy is the most accurate diagnostic test for infections such as Pneumocystis or tuberculosis. In addition, bronchoscopy is often the most accurate test for lung cancer or other mass lesions of the lung, such as abscess. This is true if they are located centrally and are too deep to be reached by a transthoracic lung biopsy.
- 3.** For mass lesions and infection, the only test more accurate than a bronchoscopy is an open lung biopsy.



PULMONARY

- 1. What is the abnormality seen?**
- 2. What is the most accurate test?**
- 3. What case goes with this study?**



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KAPLAN
MEDICAL

A.

PULMONARY

- 1.** The abnormality is a right upper lobe cavitory lesion with some post-obstructive pneumonia. The most likely cause is a bacterial lung abscess, although tuberculosis or a cavitating lung cancer can also give a lung cavity.
- 2.** The most accurate test for a lung mass or cavity is a lung biopsy. You must have tissue to diagnose cancer or to obtain a specific microbiologic diagnosis.
- 3.** For a lung abscess, look for a patient described as febrile with a cough for the last several weeks, weight loss, and possibly malodorous sputum. Lung abscess is most common in those with an increased risk of aspiration, such as alcoholics and patients after a seizure, stroke, or intubation.

Q.

PULMONARY

1. What is the abnormality seen?
2. What is the most accurate test?
3. What case goes with this study?



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KAPLAN
MEDICAL

PULMONARY

1. The film on the left side shows an infiltrate in the right middle lobe. The film on the right shows the normal structures of the lung such as the major and minor fissures, which are drawn in dark ink on the films. The most likely etiology of this infection is *Streptococcus pneumonia*, although *hemophilus* is also possible.
2. The most accurate test of any bacterial infection is a Gram's stain of the sputum and a sputum culture. Culture is always the right answer for the answer to the "most accurate diagnostic test" question, if it is an infection.
3. Answer chest X ray as the best initial test whenever there is fever and a cough or shortness of breath.

Q.

PULMONARY

- 1. What is the study and what is the abnormality seen?**
- 2. What is the most common etiology?**
- 3. What is the most accurate test?**



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KAPLAN
MEDICAL

A.

PULMONARY

1. This is a chest X ray that shows bilateral interstitial infiltrates.
2. Interstitial infiltrates can be caused by viral pneumonia, pneumocystis, mycoplasma, chlamydia, coxiella, and sometimes legionella.
3. The most accurate test depends on the etiology:
 - Mycoplasma, Chlamydia, Coxiella—serology (antibody titers)
 - Legionella—urine antigen testing, culture on specialized media
 - PCP—bronchoalveolar lavage, increased LDH



OPHTHALMOLOGY

Tonometry

- 1. What is this?**
- 2. How is it done?**
- 3. What is the most accurate form of this test?**
- 4. When do you answer tonometry?**

A.

OPHTHALMOLOGY

1. Tonometry is the test used to measure intraocular pressure (IOP). It tests for **glaucoma**.
2. There are several ways of performing tonometry: **Pneumotonometry** is used as a screening tool. It measures IOP with a puff of air to flatten the cornea. **Golmann tonometry** is the more accurate way to measure IOP. It combines a slit lamp with a special probe that flattens the cornea and a weight that determines the amount of pressure.
3. The most accurate test is the **electronic indentation tonometry** where a small pinlike instrument is placed directly on the cornea and the pressure is read back on a monitor.
4. Tonometry is **both** the best initial and most accurate test for glaucoma.



OPHTHALMOLOGY

Gonioscopy

- 1. What is the most common indication for this test?**
- 2. How does it work?**
- 3. When do you answer gonioscopy?**

OPHTHALMOLOGY

1. Gonioscopy is visualization of the angle between the cornea and the iris. This is performed to assess for **narrow angle or angle closure in glaucoma**.
2. In gonioscopy, light from the slit lamp is deflected obliquely through the cornea using a prism or mirror in order to get a view of the angle between the cornea and iris. The trabecular meshwork and Schlemm's canal, the drainage system of the eye, lie in this angle.
3. You answer gonioscopy when you see a case of glaucoma with a red, painful eye with a fixed, mid-dilated pupil, and tonometry has already confirmed glaucoma. Gonioscopy is used to determine the type of glaucoma after the diagnosis has been made.

OPHTHALMOLOGY

Slit-Lamp Exam

1. For which clinical scenario(s) is this test the appropriate screening?
2. What is depicted in this photo?
3. When do you answer slit-lamp examination?



Image used courtesy of the Online Journal of Ophthalmology
(www.onioph.com)

OPHTHALMOLOGY

- 1.** Slit-lamp examination is a microscopic examination of the anterior half of the eye by projecting a thin beam of light through a slit. The anterior half includes lids, lashes, adnexa, conjunctiva, sclera, cornea, iris, pupil, and lens. When combined with special lenses, the slit-lamp may also be used to examine the posterior eye (cup/disk, macula, vessels, periphery).
- 2.** In this photo, a Kayser-Fleischer ring is formed by copper deposits in Descemet's membrane of the cornea. This finding is diagnostic of Wilson's disease, a disorder of copper excretion.
- 3.** Answer slit-lamp exam when you are shown a patient with a red, painful eye when the pain is worsened by shining a light in the eye or photophobia. When severe photophobia is not associated with meningitis it can be from iritis/uveitis, which is an inflammation of the iris. Slit-lamp is also a very good way to detect cataracts or corneal injury.



OPHTHALMOLOGY

- 1. What is this?**
- 2. What disease is commonly associated with it?**
- 3. What causes it?**



Image used courtesy of the American Academy of Ophthalmology.

A.

OPHTHALMOLOGY

1. A Roth spot is actually a cotton wool spot (infarct) with surrounding hemorrhage.
2. **Subacute bacterial endocarditis** is commonly associated; however, Roth spots are not specific for subacute bacterial endocarditis and may be present in several other disorders, such as **leukemia, anemia, diabetes, hypertension, and HIV.**
3. Roth spots in subacute bacterial endocarditis are an immunological phenomenon.

Q.

OPHTHALMOLOGY

- 1. What is this?**
- 2. What is the usual cause?**
- 3. How is it treated?**



Image used courtesy of the American Academy of Ophthalmology.

KAPLAN
MEDICAL

A.

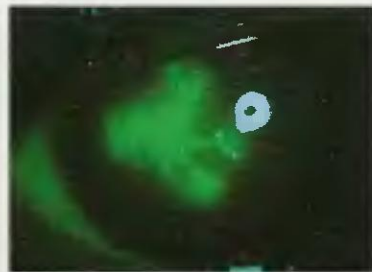
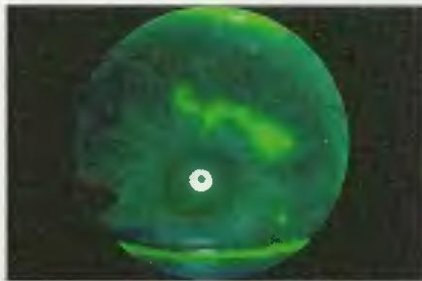
OPHTHALMOLOGY

1. Patients with retinal detachment often describe an ascending/descending veil in front of one eye with flashes and floaters. The unilateral loss of vision is sudden and painless.
2. Retinal detachment is usually caused by a retinal tear.
3. **Retinal detachment is a medical emergency!** Laser surgery or cryopexy is always used to help reattach the retina. A scleral buckle may be placed like a belt around the outside of the eye to push the wall against the detached retina, or a vitrectomy may be done where the vitreous is removed and replaced with a gas that pushes the retina against the wall of the eye.



OPHTHALMOLOGY

1. What is this test?
2. For which clinical scenario(s) is this test commonly performed?
3. What is a normal result?
4. When do you answer this test?



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KAPLAN
MEDICAL

OPHTHALMOLOGY

1. This is a fluorescein eye stain of the cornea.
 2. After manual staining of the eye with fluorescein, the eye is exposed to a blue light that detects foreign bodies or damage to the cornea. Fluorescein staining is used in the evaluation of the following corneal injuries:
 - Corneal abrasion
 - Infection
 - Injury or trauma
 - Foreign bodies
 - Abnormal tear production
 - Keratoconjunctivitis sicca
- NOTE:** Abnormalities in the surface of the cornea will be stained and appear green.
3. Normally, the dye stays in the tear film (water, mucus, oil) and does **not** adhere to the cornea.
 4. The most likely question in which a fluorescein stain is the answer is when you are shown a person who has had ocular trauma and there is very severe pain, and you need to exclude a corneal abrasion.

Q.

OPHTHALMOLOGY

- 1. What disease is this?**
- 2. What are two major complications of this disease?**
- 3. How is it treated?**



Image used courtesy of the National Eye Institute, National Institutes of Health.

OPHTHALMOLOGY

- 1.** This photograph represents proliferative diabetic retinopathy (PDR). There is neovascularization over the disc, covering much of the surface area of the retina. Neovascularization differentiates PDR from non-PDR. The aberrant blood vessels are fragile and leaky, causing recurrent retinal and vitreous hemorrhages. Dot-blot hemorrhages, microaneurysms, hard exudates, cotton wool spots, and intraretinal microvascular abnormalities (IRMA) are present in both PDR and non-PDR.
- 2.** PDR can lead to retinal detachment and neovascular glaucoma.
- 3.** The treatment of PDR is with pan retinal photocoagulation.